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**PREAMBLE TO AMENDMENT TO PART 571
FEDERAL MOTOR VEHICLE SAFETY STANDARDS**

Subpart A—General

(Docket No. 78-13; Notice 2)

Action: Final rule.

Summary: The purpose of this notice is to amend the definition of "designated seating position" (49 CFR 571.3) to clarify that the term includes any position likely to be used for seating accommodation while the vehicle is in motion. This amendment is based on a notice of proposed rulemaking issued September 21, 1978 (43 FR 44556). Dimensional parameters are specified in the amended definition to ensure proper and consistent designations of seating positions. This clarification is intended to ensure that all positions likely to be used for seating accommodation will be equipped with occupant restraint systems for the protection of the persons using those positions and to ensure that vehicles are safely designed to accommodate their actual occupant capacity.

Effective date: September 1, 1980.

Addresses: Any petitions for reconsideration should refer to the docket number and notice number and be submitted to: Docket Section, Room 5108—Nassif Building, 400 Seventh Street, S.W., Washington, D.C. 20590.

For further information contact:

Guy Hunter, Office of Vehicle Safety Standards, National Highway Traffic Safety Administration, Washington, D.C. 20590 (202-426-2265).

Supplementary information: Safety Standard No. 208 (49 CFR 571.208) requires manufacturers to provide occupant crash protection for each "designated seating position" in motor vehicles. That term is defined in 49 CFR 571.3 as:

"[A]ny plan view location intended by the manufacturer to provide seating accommodation while the vehicle is in motion, for a person at least as large as a fifth percentile adult female, except auxiliary seating accommodations such as temporary or folding jump seats."

(Note: "plan view" means an overhead view looking down)

Last year, the NHTSA published a notification to vehicle manufacturers concerning the agency's interpretation of the term "designated seating position", because of concern that certain recent vehicle models have improperly designated seating capacities (43 FR 21893, May 22, 1978). The front or rear seats in these models have been designated by their manufacturers as having only two seating positions even though the seats are clearly capable of accommodating three adult occupants and are being so used. This, of course, represents a safety threat to the center-seat passenger since no restraint system is provided. These designations are not only improper but also inconsistent with other designations because the manufacturers designate other models with equivalent seating space as having three positions and provide three sets of restraint systems.

The earlier notification emphasized that although it is the manufacturer which designates the number of seating positions under the current definition, the manufacturer's intent will be determined by the agency on the basis of all facts and his declarations of intent will not be accepted by the agency if they are inconsistent with the

actual vehicle design. NHTSA letters of interpretation have always emphasized that the manufacturer's designation must be made in good faith and must conform to the basic policies and tenor of the National Traffic and Motor Vehicle Safety Act (15 U.S.C. 1381, *et seq.*).

Manufacturers' comments to the notification led the agency to issue a proposal to amend the definition of "designated seating position" to provide an adequate number of occupant restraints, to secure greater consistency in the seating capacity designations by the manufacturers, and to assure consumers contemplating buying a new vehicle that comparable vehicle sizes are similarly designated (43 FR 44556, September 28, 1978). As pointed out in the proposal, an investigation of the criteria used by manufacturers to designate seating capacities of current models indicates that manufacturers' designations often involve many purely marketing considerations. The proposal cited the example of one manufacturer that stated to the agency it changed the front and rear seating configuration on one of its models from 3 front-2 back to 2 front/3 back (number of positions) because competitive cars with similar dimensions for front-seat shoulder and hip room were being designated with only two front seat positions. This designation change was made even though the front and rear seats remained virtually the same in terms of available seating space.

Manufacturers have pointed to seat width, hip room, shoulder room, leg room, seat trim and seat padding among other things to demonstrate their "intent" concerning the number of positions that should be used for seating accommodation. For example, even though a particular model might have sufficient hip room for three adult passengers, the manufacturer points to seat trim and lack of comparable padding in the center position as evidence that the manufacturer does not intend for that position to be used. As noted in the proposal, however, this reasoning does not take into account the realities of the vehicle's actual use and what the manufacturer can expect if he has provided sufficient room for a third passenger, even if the center position is not as comfortable as the two outside seat positions. If there is sufficient space on a bench or split bench seat for a center seat passenger, and no

rigid obstruction such as a console, it must be said that the manufacturer "intended" that space to be used as a seating position, since the center position will likely be used by a substantial number of persons.

In order to clarify the existing definition of "designated seating position" and to codify the agency's interpretations of that definition, the previous notice proposed to amend the definition as follows to remove reference to the manufacturer's "intent" and to specify dimensional criteria to assure proper and consistent designations of seating capacity:

"'Designated seating position' means any plan view location capable of accommodating a person at least as large as a 5th percentile adult female, if the overall seat configuration and design and vehicle design is such that the position is likely to be used as a seating position while the vehicle is in motion, except for auxiliary seating accommodations such as temporary or folding jump seats. Any bench or split-bench seat in a passenger car, truck, or multipurpose passenger vehicle with a GVWR less than 10,000 pounds, having greater than 50 inches of hip space shall have not less than three designated seating positions."

The agency has analyzed and given due consideration to the twenty-one comments that were received from interested persons concerning the proposed amendment of "designated seating position". All comments have been considered. Several modifications of the amended definition have been made in response to those comments. The great majority of comments did not disagree with the intended purpose of the proposed amendment. For example, General Motors Corporation stated that it does not oppose the concept that a vehicle manufacturer should provide occupant restraint systems for persons who use the seating accommodations provided in the vehicle.

American Motors Corporation did question the need for a revision of the definition and stated that the proposal contained "only unsubstantiated allegations of improper designation of seating positions". In response to this comment, the agency is placing in the public docket a copy of the Motor Vehicle Manufacturers Association

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The earlier notification emphasized that although it is the manufacturer which designates the number of seating positions under the current definition, the manufacturer's intent will be determined by the agency on the basis of all facts and his declarations of intent will not be accepted by the agency if they are inconsistent with the

actual vehicle design. NHTSA letters of interpretation have always emphasized that the manufacturer's designation must be made in good faith and must conform to the basic policies and tenor of the National Traffic and Motor Vehicle Safety Act (15 U.S.C. 1381, *et seq.*).

Manufacturers' comments to the notification led the agency to issue a proposal to amend the definition of "designated seating position" to provide an adequate number of occupant restraints, to secure greater consistency in the seating capacity designations by the manufacturers, and to assure consumers contemplating buying a new vehicle that comparable vehicle sizes are similarly designated (43 FR 44556, September 28, 1978). As pointed out in the proposal, an investigation of the criteria used by manufacturers to designate seating capacities of current models indicates that manufacturers' designations often involve many purely marketing considerations. The proposal cited the example of one manufacturer that stated to the agency it changed the front and rear seating configuration on one of its models from 3 front-2 back to 2 front/3 back (number of positions) because competitive cars with similar dimensions for front-seat shoulder and hip room were being designated with only two front seat positions. This designation change was made even though the front and rear seats remained virtually the same in terms of available seating space.

Manufacturers have pointed to seat width, hip room, shoulder room, leg room, seat trim and seat padding among other things to demonstrate their "intent" concerning the number of positions that should be used for seating accommodation. For example, even though a particular model might have sufficient hip room for three adult passengers, the manufacturer points to seat trim and lack of comparable padding in the center position as evidence that the manufacturer does not intend for that position to be used. As noted in the proposal, however, this reasoning does not take into account the realities of the vehicle's actual use and what the manufacturer can expect if he has provided sufficient room for a third passenger, even if the center position is not as comfortable as the two outside seat positions. If there is sufficient space on a bench or split bench seat for a center seat passenger, and no

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The agency has analyzed and given due consideration to the twenty-one comments that were received from interested persons concerning the proposed amendment of "designated seating position". All comments have been considered. Several modifications of the amended definition have been made in response to those comments. The great majority of comments did not disagree with the intended purpose of the proposed amendment. For example, General Motors Corporation stated that it does not oppose the concept that a vehicle manufacturer should provide occupant restraint systems for persons who use the seating accommodations provided in the vehicle.

American Motors Corporation did question the need for a revision of the definition and stated that the proposal contained "only unsubstantiated allegations of improper designation of seating positions". In response to this comment, the agency is placing in the public docket a copy of the Motor Vehicle Manufacturers Association

specifications for various 1978 and 1979 model vehicles. These data list vehicle models and specify their hip-room and the number of positions currently designated by manufacturers. These specifications demonstrate the inconsistencies in many current designations and illustrate that bench and split-bench seats in some vehicle models have only two designated seating positions even though a similar vehicle model of the same make has three designated positions with less seating space.

Neither American Motors nor any other commenter refuted the fact that there are many vehicle models with usable center seats that are not designated as "seating positions". However, American Motors charged that the proposal only contained "baseless assertions of the NHTSA's perception of real-world uses of center front seating positions". It is the NHTSA's position that every center seating position that is likely to be used should be equipped with a restraint system regardless of the overall statistical rate of use of center positions, since every potential occupant should be afforded protection in the event of a vehicle crash. The existing definition of "designated seating position" is based on this premise. The agency is, however, placing copies of vehicle accident statistics in the docket which show that the number of center-seat passengers in motor vehicles and the number of center-seat fatalities and injuries is substantial. Data from the NHTSA's Fatal Accident Reporting System show that in 1977, 588 front center-seat passengers and 365 rear center-seat passengers were killed in vehicle accidents. Further, the use rate of center-seat positions will be affected by the future design of vehicles. Therefore, the clarified definition of "designated seating position" will ensure that future designs do not encourage center-seat use unless occupant crash protection is afforded those positions.

While the majority of comments agreed with the concept of the proposed change, there were numerous complaints about the language of the proposed definition. Several commenters objected to the phrase, "the position is likely to be used as a seating position", arguing that the word "likely" is subjective. Holiday Rambler Corporation stated that neither the manufacturer nor NHTSA can reasonably anticipate where

occupants of a vehicle are likely to sit while the vehicle is in motion, as vehicles are often subject to misuse or abuse by their occupants. Other commenters stated that manufacturers would not be certain their determination of "likely use" would be the same as the agency's determination.

The agency does not agree that the definition is subjective, since the definition does not only provide that any position likely to be used is a designated seating position, it also provides the criteria for making that determination. Those criteria relate to vehicle design and the overall seat configuration. Further, the amended definition is more objective than the existing definition which is based on manufacturer's intent, which has not given rise to any complaints of subjectivity. NHTSA interpretations have emphasized that "intent" does not mean that manufacturers have "carte blanche" to designate seating capacities, but rather, that the manufacturer's intent is determined by the seat configuration and vehicle design.

International Harvester suggested that the word "likely" be dropped from the definition and that the phrase "is to be used as a seating position" be substituted. The agency does not believe this would be a meaningful change, however, since the manufacturer's determination would still be based on the particular vehicle design and seat configuration. Further, the word "likely" indicates that the use must be more than minimal or chance use. As noted by General Motors, Webster's New World Dictionary defines the word "likely" to mean probable or fairly certain. In response to Holiday Rambler's comment, the agency notes that the word "likely" relieves manufacturers of the responsibility of providing for abusive or unorthodox use of a particular position in a motor vehicle. For example, people would not "likely" sit on a rigid console even though a few individuals might misuse this position from time to time. Under the definition, a manufacturer would not be required to consider the console as a designated seating position.

General Motors suggested that the same phrase be changed to read, "Likely to be used by a substantial number of people". However, the agency believes that such a change is unnecessary for

the reasons set forth in the immediately preceding paragraph.

Rover Triumph recommended that the phrase be changed to read, "any plan view location provided with an upholstered seat and backrest capable of accommodating a person at least as large as a 5th percentile adult female". The agency believes that such a change would be unduly stringent, however, since the overall vehicle design would not be considered in determining designated seating capacity under such a definition. There may be some locations capable of accommodating a 5th percentile female that are not likely to be used because of the overall vehicle design (a protruding dash board at the center position, for example). The agency has concluded that any definition of "designated seating position" must necessarily be subjective to a certain extent, to avoid being too restrictive or harsh on manufacturers.

The proposed definition change of "designated seating position" included the following caveat to ensure proper and consistent designations of seating capacity:

"... Any bench or split-bench seat in a passenger car, truck or multipurpose passenger vehicle with a GVWR less than 10,000 pounds, having greater than 50 inches of hip space shall have not less than three designated seating positions."

There were numerous comments concerning this caveat. Nissan, Toyota, Toyo Kogyo, and Mercedes-Benz pointed out that the caveat specifies no procedure for measuring hip room, and suggested that the SAE Standard J1100(a) procedure be used. The NHTSA agrees that a procedure should be specified and intended for the measurement to be according to the SAE Standard J1100(a). This is the same procedure used in the regulations of the Environmental Protection Agency for providing fuel economy information for comparable vehicles. Accordingly, that procedure is included in the caveat as set forth in this notice. Also, in response to a comment by General Motors the phrase "hip space" is changed to read "hip room", to correspond with the language of SAE Standard J1100(a).

Many commenters stated that "hip room" should not be the only determinative factor in the caveat. Commenters argued that shoulder room, leg room, head clearance, and other factors should also be considered in determining the number of designated seating positions on a bench or split-bench seat. Ford Motor Company stated that hip room is not as useful a descriptor as shoulder room in determining the number of positions that can be used. Ford stated that a hip room of 51.1 inches and a shoulder room of 53.8 inches are required to seat side-by-side three persons of randomly selected sizes at least 50 percent of the time. Volkswagen and Toyota also disagreed with the hip-room criteria and argued that the driver must be afforded more room for safe and comfortable operation of the vehicle than is provided if a 50-inch hip room criteria is used without also specifying shoulder room.

The NHTSA agrees that shoulder room, leg room, and head clearance are factors which may influence the number of persons who will use a bench or split-bench seat. However, the agency has concluded that hip room is the primary factor that determines the number of persons who will likely use a seat. Also, data obtained from the Motor Vehicle Manufacturers Association indicates that the vast majority of vehicles have more shoulder room than hip room. Thus, a vehicle that has 50 inches of hip room will nearly always have at least 50 inches of shoulder room and in all probability more than 50 inches of shoulder room. The shoulder width of a 5th percentile adult female is 15.7 inches. Therefore, three occupants of that size could easily sit abreast on a bench or split-bench seat having only 50 inches of shoulder room. In setting the hip-room criteria in the proposed definition, the agency used the dimension that is approximately three times the width of a 16.5-inch hip, 95th percentile adult male (a male weighing 215 pounds). As the agency pointed out in the proposal, this would be sufficient hip space for three large-size adults to sit side-by-side. In basing the 50-inch criteria on the 95th percentile male rather than on the hip width of 5th percentile females, the agency proposed a liberal limit on the manufacturer's designation of seating capacity. Fifty inches of hip space is not only adequate to sit three large-size adults side-by-side,

specifications for various 1978 and 1979 model vehicles. These data list vehicle models and specify their hip-room and the number of positions currently designated by manufacturers. These specifications demonstrate the inconsistencies in many current designations and illustrate that bench and split-bench seats in some vehicle models have only two designated seating positions even though a similar vehicle model of the same make has three designated positions with less seating space.

Neither American Motors nor any other commenter refuted the fact that there are many vehicle models with usable center seats that are not designated as "seating positions". However, American Motors charged that the proposal only contained "baseless assertions of the NHTSA's perception of real-world uses of center front seating positions". It is the NHTSA's position that every center seating position that is likely to be used should be equipped with a restraint system regardless of the overall statistical rate of use of center positions, since every potential occupant should be afforded protection in the event of a vehicle crash. The existing definition of "designated seating position" is based on this premise. The agency is, however, placing copies of vehicle accident statistics in the docket which show that the number of center-seat passengers in motor vehicles and the number of center-seat fatalities and injuries is substantial. Data from the NHTSA's Fatal Accident Reporting System show that in 1977, 588 front center-seat passengers and 365 rear center-seat passengers were killed in vehicle accidents. Further, the use rate of center-seat positions will be affected by the future design of vehicles. Therefore, the clarified definition of "designated seating position" will ensure that future designs do not encourage center-seat use unless occupant crash protection is afforded those positions.

While the majority of comments agreed with the concept of the proposed change, there were numerous complaints about the language of the proposed definition. Several commenters objected to the phrase, "the position is likely to be used as a seating position", arguing that the word "likely" is subjective. Holiday Rambler Corporation stated that neither the manufacturer nor NHTSA can reasonably anticipate where

occupants of a vehicle are likely to sit while the vehicle is in motion, as vehicles are often subject to misuse or abuse by their occupants. Other commenters stated that manufacturers would not be certain their determination of "likely use" would be the same as the agency's determination.

The agency does not agree that the definition is subjective, since the definition does not only provide that any position likely to be used is a designated seating position, it also provides the criteria for making that determination. Those criteria relate to vehicle design and the overall seat configuration. Further, the amended definition is more objective than the existing definition which is based on manufacturer's intent, which has not given rise to any complaints of subjectivity. NHTSA interpretations have emphasized that "intent" does not mean that manufacturers have "carte blanche" to designate seating capacities, but rather, that the manufacturer's intent is determined by the seat configuration and vehicle design.

International Harvester suggested that the word "likely" be dropped from the definition and that the phrase "is to be used as a seating position" be substituted. The agency does not believe this would be a meaningful change, however, since the manufacturer's determination would still be based on the particular vehicle design and seat configuration. Further, the word "likely" indicates that the use must be more than minimal or chance use. As noted by General Motors, Webster's New World Dictionary defines the word "likely" to mean probable or fairly certain. In response to Holiday Rambler's comment, the agency notes that the word "likely" relieves manufacturers of the responsibility of providing for abusive or unorthodox use of a particular position in a motor vehicle. For example, people would not "likely" sit on a rigid console even though a few individuals might misuse this position from time to time. Under the definition, a manufacturer would not be required to consider the console as a designated seating position.

General Motors suggested that the same phrase be changed to read, "Likely to be used by a substantial number of people". However, the agency believes that such a change is unnecessary for

as the agency noted in the preamble of the proposal. Therefore, the space occupied by a rigid console or a fixed, stationary armrest, for example, would not be considered hip room and would not be included in the measurement of the 50-inch limitation. This does not mean, however, that small, upholstered elevations or depressions in a bench seat should not be included in the measurement since these designs do not impede the use of center positions. To be excepted from the measurement there would have to be an obvious obstruction or impediment to sitting in the position, such that the position is obviously not intended to be used as a seat. A movable armrest that can be raised to the seat back would not constitute an impediment to use of the position. Likewise, the presence of a floor gear-shift lever would not normally be sufficient to discourage or make use of a center position on a bench seat impossible, even if the bench seat has a slightly indented contour for the shift lever. However, there could conceivably be a vehicle design in which the lever would constitute an impediment to sitting (if the lever extends to within a few inches of the seat back, for example). Regarding "integral occupant restraint mountings or hardware", if there is greater than 50 inches of hip room on the bench or split-bench seat there generally must be three designated seating positions, and the hardware will be situated in a manner not to create an impediment to seating. If no padding or upholstery is provided on the seat and if no back rest is provided, it is not likely that the position would be used and the agency would not include the space in measurement of hip room. Also, if there is a movable armrest that can be lifted to substitute as a backrest that position on the bench seat would likely be used and the space would be included in the measurement of hip room.

Fiat and several other commenters requested that the meaning of bench seat and split-bench seat be defined, one requesting that a definition be included. Fiat requested, specifically, that the agency specify that if a central armrest is provided a seat should not be considered a "bench" seat. The agency does not believe it is necessary to add a definition of "bench" and "split-bench" seat to the definition of "designated seating position". Bench and split-bench seats are seats

other than conventional bucket seats. Bucket seats are separated by a substantial amount of space and are two distinct seats. Split-bench seats are generally separated, if at all, only slightly to the extent necessary for independent movement of the separate portions. Therefore, any seat design having greater than 50 inches of continuous hip room, even if interrupted slightly to allow independent movement of separate portions, would be considered a bench or split-bench seat and would have to have three designated seating positions.

In order to respond to the concerns of Fiat, Ford, and other commenters, the agency has determined that the caveat should be changed to clarify that if rigid obstructions or other designs preclude the use of the center position, that position need not be designated as a seating position and, therefore, need not be equipped with restraints regardless of the overall width of the seat. Therefore, the caveat as issued in this notice includes the phrase, "unless the seat design or vehicle design is such that the center position cannot be used for seating." This exception to the caveat would include, for example, a bench seat having greater than 50 inches of actual hip space if the vehicle's design is such that the dash board at the center position, extends out to near the seat back, precluding use of the seat space. Likewise, the exception would include a *fixed* armrest or a rigid, *fixed* console located in the center of the bench or split-bench seat.

General Motors requested that the 50-inch caveat be modified to allow only two designated seating positions in vehicles having bench or split-bench seats equipped with passive seat belts at the outboard positions. General Motors stated that the proposed definition would preclude the use of passive belts in full-size cars equipped with bench seats, presumably because there are currently no designs for center-position passive belts. General Motors argued that bench seats are somewhat cheaper than bucket seats, and that passengers are not likely to crawl under the outside passive belt to occupy the center position. The agency does not agree that the center position of a bench seat equipped with passive belts would not be used. If there is sufficient space on a bench or split-bench for three passengers, a substantial number of persons are likely to use

but more than adequate to sit random size riders side-by-side, particularly if one of the occupants is a child. If one of the occupants is smaller than a 95th percentile male, shoulder room would be more than ample if the hip room is greater than 50 inches. In either case, there would be more than ample room for the driver to comfortably and safely operate the vehicle.

The agency has concluded that manufacturers must assume that three persons will likely use a bench or split-bench seat if there is over 50 inches of usable hip room. The agency rejects Ford's recommendation that the criteria be 51.1 inches of hip room, since Ford offers no data to indicate 50 inches is an unrealistic limit. We do note, however, that one current Ford model has a front bench seat with 55.9 inches of hip room and yet only two designated seating positions.

The agency has concluded that the addition of a shoulder room or leg room specification in the caveat is an unnecessary complication of the criteria since the 50 inch hip room specification is a liberal limit on manufacturers' discretion in this area. The Australian Design Rule No. 5A is more stringent. It specifies that, in the case of bench seats, the number of seating positions shall be the number of complete multiples of 16 inches. Therefore, under the Australian rule three positions are required to be designated if a bench seat has only 48 inches of hip room.

Toyo Kogyo questioned whether, in the case of hip room less than 50 inches, designating only two seating positions is "unconditionally permitted." The notice proposing this amendment stated that the 50-inch specification does not mean that some vehicle seats with less than 50 inches of hip space should not also have more than two designated seating positions, if the vehicle and seat design is such that three positions would likely be used. It was pointed out that the specification is merely the amount of space the agency will consider as conclusive evidence that there should be at least three designated seating positions. These statements are not intended to imply that the agency would require seating position designations for each space capable of accommodating a 5th percentile female if the overall vehicle design and seat configuration is such that three positions would not likely

be used. However, the seat design should be such that it is obviously to be used by only two persons if the manufacturer only designates two positions. For further guidance, see the discussion below of obstructions and impediments that will affect designations.

Several commenters requested other changes in the 50-inch hip room caveat of the proposed definition. American Motors stated that a specified hip room caveat is unnecessary due to the first part of the proposed definition: "Given the fact that unless the overall vehicle/seat configuration is such that a third dsp (designated seating position) is impracticable, any 50-inch-wide seat will have the capability of accommodating at least three 5th percentile adult females and be so designated. Therefore, a specified hip space criterion of 50 inches is redundant to the first part of the proposed definition." While the NHTSA acknowledges American Motors' statement that any 50-inch-wide seat will have the capability of accommodating at least three occupants, the agency does not agree that such a seat would always be designated as having three positions if the caveat were not present. Past industry practice in some cases supports this conclusion, as evidenced, for example, by American Motors' 1977 "Pacer" model vehicle, which has 55.8 inches of hip room in the front seat, yet only two designated seating positions. As the agency stated in the notice proposing this amendment, the caveat is intended to emphasize the amount of space the agency will consider as conclusive evidence that there should be at least three designated seating positions.

Ford Motor Company stated that the caveat, as proposed, implies that vehicles with bench or split-bench seats having over 50 inches of hip room must have three designated seating positions, "regardless of the existence of impediments such as consoles, shift levers, fixed arm rests, trays, integral occupant restraint mountings or hardware, hard unsprung or unupholstered surfaces, or center depressions or elevations." Ford suggested that any limiting caveat be accompanied with the provision that it is "applicable only to seating obviously designed for three or more occupants." The NHTSA, of course, did not intend for the definition to imply that a rigid console should be considered a seating position,

as the agency noted in the preamble of the proposal. Therefore, the space occupied by a rigid console or a fixed, stationary armrest, for example, would not be considered hip room and would not be included in the measurement of the 50-inch limitation. This does not mean, however, that small, upholstered elevations or depressions in a bench seat should not be included in the measurement since these designs do not impede the use of center positions. To be excepted from the measurement there would have to be an obvious obstruction or impediment to sitting in the position, such that the position is obviously not intended to be used as a seat. A movable armrest that can be raised to the seat back would not constitute an impediment to use of the position. Likewise, the presence of a floor gear-shift lever would not normally be sufficient to discourage or make use of a center position on a bench seat impossible, even if the bench seat has a slightly indented contour for the shift lever. However, there could conceivably be a vehicle design in which the lever would constitute an impediment to sitting (if the lever extends to within a few inches of the seat back, for example). Regarding "integral occupant restraint mountings or hardware", if there is greater than 50 inches of hip room on the bench or split-bench seat there generally must be three designated seating positions, and the hardware will be situated in a manner not to create an impediment to seating. If no padding or upholstery is provided on the seat and if no back rest is provided, it is not likely that the position would be used and the agency would not include the space in measurement of hip room. Also, if there is a movable armrest that can be lifted to substitute as a backrest that position on the bench seat would likely be used and the space would be included in the measurement of hip room.

Fiat and several other commenters requested that the meaning of bench seat and split-bench seat be defined, one requesting that a definition be included. Fiat requested, specifically, that the agency specify that if a central armrest is provided a seat should not be considered a "bench" seat. The agency does not believe it is necessary to add a definition of "bench" and "split-bench" seat to the definition of "designated seating position". Bench and split-bench seats are seats

other than conventional bucket seats. Bucket seats are separated by a substantial amount of space and are two distinct seats. Split-bench seats are generally separated, if at all, only slightly to the extent necessary for independent movement of the separate portions. Therefore, any seat design having greater than 50 inches of continuous hip room, even if interrupted slightly to allow independent movement of separate portions, would be considered a bench or split-bench seat and would have to have three designated seating positions.

In order to respond to the concerns of Fiat, Ford, and other commenters, the agency has determined that the caveat should be changed to clarify that if rigid obstructions or other designs preclude the use of the center position, that position need not be designated as a seating position and, therefore, need not be equipped with restraints regardless of the overall width of the seat. Therefore, the caveat as issued in this notice includes the phrase, "unless the seat design or vehicle design is such that the center position cannot be used for seating." This exception to the caveat would include, for example, a bench seat having greater than 50 inches of actual hip space if the vehicle's design is such that the dash board at the center position, extends out to near the seat back, precluding use of the seat space. Likewise, the exception would include a *fixed* armrest or a rigid, *fixed* console located in the center of the bench or split-bench seat.

General Motors requested that the 50-inch caveat be modified to allow only two designated seating positions in vehicles having bench or split-bench seats equipped with passive seat belts at the outboard positions. General Motors stated that the proposed definition would preclude the use of passive belts in full-size cars equipped with bench seats, presumably because there are currently no designs for center-position passive belts. General Motors argued that bench seats are somewhat cheaper than bucket seats, and that passengers are not likely to crawl under the outside passive belt to occupy the center position. The agency does not agree that the center position of a bench seat equipped with passive belts would not be used. If there is sufficient space on a bench or split-bench for three passengers, a substantial number of persons are likely to use

the center position, even if the seat has passive belts. Passengers could move around the passive belt to gain access to the center position and parents could easily place children in such positions. Further, there is a good possibility that the exception requested by General Motors would lead to defeat of passive belts so that the center position could be used more conveniently. While the agency is sympathetic with the marketing and cost concerns of manufacturers, we believe there are alternatives which will ensure the safety of the motoring public. As General Motors stated in its comments, a vehicle's design can "make the two passenger designation more clear". For example, a manufacturer that wishes to use bench seats in vehicles equipped with passive belts can include a fixed armrest in the center position of the bench seat to emphasize that the location is not a seating position. As just noted, the definition set forth in this notice makes clear that such a center position need not be designated as a seating position. It could be argued that parents may also sit children on fixed consoles, but manufacturers will not be held responsible, with respect to designating a seating position, for abusive or unlikely use of their vehicles.

Nissan Motor Company requested that the NHTSA examine the "cost/benefit" concerns of requiring three seating positions for rear seats having greater than 50 inches of hip room. Nissan is currently designating only two seating positions in the rear seat of its Datsun models and is concerned that the new definition will require the addition of a third seat belt in the rear seat and an upgrading of the braking performance of those vehicles. Nissan stated that it assumes there is little possibility that three passengers occupy rear seats.

After considering Nissan's comments and reviewing data concerning the use of the center position in rear seats, the agency has concluded that rear seats should not be excluded from the 50-inch hip room caveat in the definition of "designated seating position". While it may be true that, statistically, fewer persons use the center rear seating position than use the center front seating position, there are substantial numbers who do use the rear position. As mentioned earlier, the agency believes that all pas-

sengers should be provided with a restraint system for occupant crash protection. If a rear seat has greater than 50 inches of unobstructed hip room, that seat is likely to be used by three passengers and the third passenger should be protected. If a manufacturer chooses to use a large rear seat and wishes to designate only two positions, it must design the seat for only two passengers. This too can be accomplished by the installation of a fixed armrest or other impediment to use of the center position.

General Motors, American Motors, and Aston Martin Lagonda challenged NHTSA's statement in the proposal preceding this amendment that the changed definition will have no inflationary impact. The manufacturers state that they will be forced to make changes in seat design, to install additional restraint systems, and to upgrade braking and other systems due to increased weight if the existing definition is altered. They charged that the cost of these changes will have a definite inflationary impact. The agency cannot agree with these statements. The amended definition is a clarification of the existing definition and a codification of its interpretation, and does not create a "demonstrably more stringent standard" as stated by General Motors. As pointed out by the agency in the earlier "Notification to Manufacturers", manufacturers have improperly and inconsistently designated seating capacity on some vehicles and failed to comply with the existing definition of "designated seating position" and its interpretations. Manufacturers have failed to designate positions in their vehicles that were obviously intended to be used for seating while the vehicle is in motion, as demonstrated by vehicle and seat design and by designations in comparable vehicle models. While the agency acknowledges that there will be costs associated with modifications that will have to be made on some vehicles, these costs will be the result of bringing vehicles into compliance with an existing standard. When the agency requires a recall campaign for noncompliance with a Federal safety standard there are, of course, often tremendous cost impacts on manufacturers. This does not mean, however, that the agency action is inflationary rulemaking. Further, the past failure of the NHTSA to adequately enforce

standards dependent on the definition of "designated seating position" does not preclude clarification of how that definition will effect enforcement of those standards in the future.

The amended definition issued today does not require manufacturers to use any particular vehicle design or seat configuration or, for example, to upgrade braking performance levels. Manufacturers are free to use any seat configuration they choose, just as they are free to build any size car they desire, with any materials they desire. The definition does not require the use of more costly bucket seats. The definition does provide, however, that if a manufacturer chooses to use a bench seat or a split-bench seat, it shall designate the number of seating positions that seat actually contains. This has been the requirement since the definition was first issued. If a manufacturer "intends" for a position to be used he should provide restraints and ensure that the other vehicle systems are safely constructed to accommodate the passenger weight capacity. The inclusion of the phrase "likely to be used" in the amended definition does not change the requirement or add subjectivity to the requirement. If a manufacturer does not intend for a position to be used, the design of the vehicle should be such that this is obvious to vehicle users. If the design of a seat position is such that it obviously was not intended for use, it will not "likely be used". Manufacturers can easily manifest their true intent by installing stationary or fixed armrests. Manufacturers should, therefore, have no problem unless they, in fact, want to market the vehicle with a bench seat capable of seating three persons, yet designate only two seating positions.

Ford Motor Company expressed concern about the application of the proposed new definition to vehicles exceeding 10,000 pounds GVWR. Ford stated that the definition appears to be based on 5th percentile adult female accommodation and that this could require four sets of belts in some of its large trucks having bench seats with over 58 inches of hip room. The new definition specifies that any plan view location capable of accommodating a person at least as large as a 5th percentile adult female will be considered a designated seating position if the overall seat configuration and design and *vehicle*

design is such that the position is likely to be used as a seating position while the vehicle is in motion. In the case of large tractor-trailer type vehicles greatly over 10,000 pounds GVWR, the overall vehicle design is not such that four persons would likely use a bench seat. These large vehicles are primarily cargo-carrying vehicles, not passenger-carrying vehicles. Therefore, the agency would not consider the provision of four seating positions to be necessary or within the meaning of the phrase "likely to be used", found in the definition. It was for this reason that the definition's caveat requiring three seating positions for bench seats having over 50 inches of hip room was limited to vehicles under 10,000 pounds GVWR.

Holiday Rambler Corporation objected to the application of the proposed new definition of "designated seating position" to motor homes. Holiday pointed out that motor homes are designed to provide accommodations and accouterments for purposes other than transportation, such as sleeping. Holiday stated that the proposed definition would require many restraint systems in locations not required by the current definition. The agency finds no merit in Holiday's arguments since the effect of the amended definition as applied to motor homes is exactly the same as the existing definition. Motor home manufacturers are currently required to designate as a seating position any location intended by the manufacturer to provide seating accommodation while the vehicle is in motion. As has been repeatedly pointed out in past interpretations of this definition, a manufacturer's intent will be determined by the agency on the basis of all facts, and the manufacturer's declarations will not always be accepted by the agency if they are inconsistent with actual vehicle design. The amended definition clarifies and codifies this interpretation by removing reference to the manufacturer's intent and emphasizing that any position likely to be used while the vehicle is in motion will be considered a designated seating position. Whether a seat will "likely be used while the vehicle is in motion" will be determined by the seat configuration and design and by the vehicle design.

The agency is currently investigating noncompliance with the existing definition of "desig-

the center position, even if the seat has passive belts. Passengers could move around the passive belt to gain access to the center position and parents could easily place children in such positions. Further, there is a good possibility that the exception requested by General Motors would lead to defeat of passive belts so that the center position could be used more conveniently. While the agency is sympathetic with the marketing and cost concerns of manufacturers, we believe there are alternatives which will ensure the safety of the motoring public. As General Motors stated in its comments, a vehicle's design can "make the two passenger designation more clear". For example, a manufacturer that wishes to use bench seats in vehicles equipped with passive belts can include a fixed armrest in the center position of the bench seat to emphasize that the location is not a seating position. As just noted, the definition set forth in this notice makes clear that such a center position need not be designated as a seating position. It could be argued that parents may also sit children on fixed consoles, but manufacturers will not be held responsible, with respect to designating a seating position, for abusive or unlikely use of their vehicles.

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After considering Nissan's comments and reviewing data concerning the use of the center position in rear seats, the agency has concluded that rear seats should not be excluded from the 50-inch hip room caveat in the definition of "designated seating position". While it may be true that, statistically, fewer persons use the center rear seating position than use the center front seating position, there are substantial numbers who do use the rear position. As mentioned earlier, the agency believes that all pas-

sengers should be provided with a restraint system for occupant crash protection. If a rear seat has greater than 50 inches of unobstructed hip room, that seat is likely to be used by three passengers and the third passenger should be protected. If a manufacturer chooses to use a large rear seat and wishes to designate only two positions, it must design the seat for only two passengers. This too can be accomplished by the installation of a fixed armrest or other impediment to use of the center position.

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standards dependent on the definition of "designated seating position" does not preclude clarification of how that definition will effect enforcement of those standards in the future.

The amended definition issued today does not require manufacturers to use any particular vehicle design or seat configuration or, for example, to upgrade braking performance levels. Manufacturers are free to use any seat configuration they choose, just as they are free to build any size car they desire, with any materials they desire. The definition does not require the use of more costly bucket seats. The definition does provide, however, that if a manufacturer chooses to use a bench seat or a split-bench seat, it shall designate the number of seating positions that seat actually contains. This has been the requirement since the definition was first issued. If a manufacturer "intends" for a position to be used he should provide restraints and ensure that the other vehicle systems are safely constructed to accommodate the passenger weight capacity. The inclusion of the phrase "likely to be used" in the amended definition does not change the requirement or add subjectivity to the requirement. If a manufacturer does not intend for a position to be used, the design of the vehicle should be such that this is obvious to vehicle users. If the design of a seat position is such that it obviously was not intended for use, it will not "likely be used". Manufacturers can easily manifest their true intent by installing stationary or fixed armrests. Manufacturers should, therefore, have no problem unless they, in fact, want to market the vehicle with a bench seat capable of seating three persons, yet designate only two seating positions.

Ford Motor Company expressed concern about the application of the proposed new definition to vehicles exceeding 10,000 pounds GVWR. Ford stated that the definition appears to be based on 5th percentile adult female accommodation and that this could require four sets of belts in some of its large trucks having bench seats with over 58 inches of hip room. The new definition specifies that any plan view location capable of accommodating a person at least as large as a 5th percentile adult female will be considered a designated seating position if the overall seat configuration and design and *vehicle*

design is such that the position is likely to be used as a seating position while the vehicle is in motion. In the case of large tractor-trailer type vehicles greatly over 10,000 pounds GVWR, the overall vehicle design is not such that four persons would likely use a bench seat. These large vehicles are primarily cargo-carrying vehicles, not passenger-carrying vehicles. Therefore, the agency would not consider the provision of four seating positions to be necessary or within the meaning of the phrase "likely to be used", found in the definition. It was for this reason that the definition's caveat requiring three seating positions for bench seats having over 50 inches of hip room was limited to vehicles under 10,000 pounds GVWR.

Holiday Rambler Corporation objected to the application of the proposed new definition of "designated seating position" to motor homes. Holiday pointed out that motor homes are designed to provide accommodations and accouterments for purposes other than transportation, such as sleeping. Holiday stated that the proposed definition would require many restraint systems in locations not required by the current definition. The agency finds no merit in Holiday's arguments since the effect of the amended definition as applied to motor homes is exactly the same as the existing definition. Motor home manufacturers are currently required to designate as a seating position any location intended by the manufacturer to provide seating accommodation while the vehicle is in motion. As has been repeatedly pointed out in past interpretations of this definition, a manufacturer's intent will be determined by the agency on the basis of all facts, and the manufacturer's declarations will not always be accepted by the agency if they are inconsistent with actual vehicle design. The amended definition clarifies and codifies this interpretation by removing reference to the manufacturer's intent and emphasizing that any position likely to be used while the vehicle is in motion will be considered a designated seating position. Whether a seat will "likely be used while the vehicle is in motion" will be determined by the seat configuration and design and by the vehicle design.

The agency is currently investigating noncompliance with the existing definition of "design-

nated seating position" in certain motor homes. These motor homes have seating positions that were obviously intended for use while the vehicle is in motion, yet the seats are not equipped with restraint systems and do not comply with Safety Standard No. 207, *Seating Systems* (49 CFR 571.207). Manufacturers of these motor homes have abused the meaning of the phrase "intended by the manufacturer" and placed labels on the seats stating that they are not intended for use while the vehicle is in motion, even though the manufacturers know the seats will in fact be used. These abuses primarily involve seats at the front driving portion of the vehicles, not seats in the rear of the vehicle that are present for living accommodation when the vehicle is stationary. One model under investigation has four pedestal seats at the front driving portion of the vehicle, yet only the front two seats are designated as seating positions. It is the agency's position that a manufacturer must provide designated seating positions for the number of persons it advertises its vehicle will accommodate. In the case of a motor home, this means that if such a vehicle is advertised to "sleep six," the manufacturer must assume that the six persons will ride in the vehicle to their sleeping destination and thus must designate six seating positions. These persons should have the benefit of occupant restraint systems and seats that meet the crashworthiness performance requirements of Safety Standard No. 207. It is the agency's position further that generally all seats in the front driving area of a motor home must be among the designated seating positions since those seats are the ones most likely to be occupied while the vehicle is in motion. For example, if a motor home is advertised as sleeping six persons and has four pedestal seats in the front driving area and several additional seats in the rear living accommodation area, the four pedestal seats and two of the seats in the rear area must be designated as seating positions.

The notice proposing this amendment of the definition of "designated seating position" specified an effective date for the proposed change of September 1, 1979. Nearly all commenters requested that the effective date of any amendment of the definition be delayed until September

1, 1980, or one year after the issuance of a final rule and coincident with the beginning of a model year. Manufacturers stated that this time would be necessary to make modifications to some of their models and would reduce the cost of these modifications. The agency has determined that these requests have merit since many manufacturers have already completed vehicle designs for their 1980 models, and since the additional period would minimize the cost of bringing their vehicles into compliance with the existing and amended definition of "designated seating position". Accordingly, the agency will not enforce the 50-inch hip room caveat of the new definition until September 1, 1980. This grace period prior to enforcement of the caveat does not mean, however, that the agency will not enforce the general provisions of the definition prior to that date, in cases in which a manufacturer has failed to designate a seat that was obviously intended for use while the vehicle is in motion and will likely be so used. General Motors' request that the effective date of any amendment be phased-in with the upcoming passive restraint requirements is hereby denied. The additional one year period specified in this notice should be ample to allow manufacturers to make any necessary modifications.

The agency has determined that this rule-making has no significant economic or environmental impacts, since it clarifies the existing definition and its interpretations. However, the agency is placing in the public docket an evaluation discussing the vehicles that are currently not in compliance with the existing definition and discussing the costs manufacturers might have to incur to bring all of their vehicle models into compliance with the existing and clarified definition of "designated seating position".

The engineer and lawyer primarily responsible for the development of this notice are Guy Hunter and Hugh Oates.

In consideration of the foregoing, the definition of "designated seating position" as specified in 49 CFR 571.3 is amended to read as follows:

"Designated seating position means any plan view location capable of accommodating a person at least as large as a 5th percentile adult female, if the overall seat configura-

tion and design and vehicle design is such that the position is likely to be used as a seating position while the vehicle is in motion, except for auxiliary seating accommodations such as temporary or folding jump seats. Any bench or split-bench seat in a passenger car, truck or multipurpose passenger vehicle with a GVWR less than 10,000 pounds, having greater than 50 inches of hip room (measured in accordance with SAE Standard J1100(a)) shall have not less than three designated seating positions,

unless the seat design or vehicle design is such that the center position cannot be used for seating.”

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 708 (15 U.S.C. 1392, 1407), delegation of authority at 49 CFR 1.50.)

Issued on April 12, 1979.

Joan Claybrook
Administrator

44 F.R. 23229
April 19, 1979

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44 F.R. 23229
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PREAMBLE TO AN AMENDMENT TO PART 571— FEDERAL MOTOR VEHICLE SAFETY STANDARD

Matter Incorporated by Reference
(Docket No. 81-14; Notice 1)

ACTION: Final rule.

SUMMARY: The Federal Motor Vehicle Safety Standards issued by NHTSA incorporate by reference a number of standards and test procedures adopted by voluntary standards associations, such as the American Society for Testing and Materials. Part 571.5 of the agency's regulations is the procedural rule that incorporates all of the materials found in the agency's safety standards. This notice amends the regulation to specify that the Director of the *Federal Register* has approved the agency's incorporations by reference and to announce that all the materials are available for inspection and copying at both the agency and the Office of the *Federal Register*.

EFFECTIVE DATE: This amendment is effective March 22, 1982.

SUPPLEMENTARY INFORMATION: The Federal Motor Vehicle Safety Standards issued by the agency incorporate by reference a number of standards and test procedures adopted by voluntary standards associations, such as the American Society for Testing and Materials and the Society of Automotive Engineers. The legal effect of incorporation by reference is that the material is treated as if it were published in full in the *Federal Register* and thus has the force and effect of law. The agency only uses incorporation by reference when the referenced material is of a detailed, technical nature and would unnecessarily add to the volume of matter printed in the *Federal Register*. In all instances, the material incorporated by reference is easily available to the public for inspection and copying.

In accordance with section 552(a) of the Administrative Procedure Act (5 U.S.C. 552(a)) and

1 CFR Part 51, the Director of the *Federal Register* must review and approve all incorporations by reference before they are effective. On March 28, 1979 (44 F.R. 18630), the Office of the *Federal Register* (OFR) established new procedures that agencies must follow to maintain approval from the Director of the *Federal Register* for the incorporation of materials by reference in the Code of Federal Regulations (CFR). Each agency is required to submit annually to the Director of the *Federal Register* a list identifying all material which the agency has incorporated by reference in the CFR. Part of the OFR's review of the list is a check of the incorporating language in the regulatory text to confirm that it meets OFR's drafting requirements (1 CFR Part 571.5). NHTSA is making several editorial changes in 49 CFR Part 571.5 of its regulations, which is the provision that incorporates by reference all of the material cited in the agency's safety standards, to conform to OFR's drafting requirements.

This notice amends Part 571.5 to add language stating that the Director of the *Federal Register* has approved all of the incorporations by reference. In addition, the agency is amending Part 571.5 to state that any proposed changes to material incorporated by reference will be published in the *Federal Register*. When the agency has incorporated material by reference, it has always specified the precise version (i.e., date, edition, etc.) of the material being incorporated by reference. Subsequent versions of material incorporated by reference are not automatically adopted. The agency has always proposed any change to any incorporated material in the *Federal Register*. Part 571.5 also is amended to state that all of the materials incorporated by reference are available for inspection and copying both at the agency and at the *Federal Register*.

The agency has determined that this procedural amendment is not a major rule within the meaning of Executive Order 12291. Likewise, it is not a significant rule within the meaning of the Department of Transportation's regulatory policies and procedures. The amendments made by this notice do not impose any substantive requirements or restrictions on the public. They merely make minor modifications in the agency's incorporation by reference procedure. Since the amendments concern a procedural matter, the agency is not required by the Administrative Procedure Act to provide notice and opportunity to comment on them. Because of this, the amendments are also not covered by the requirements of the Regulatory Flexibility Act.

Since these procedural amendments are so minor and technical, the agency does not believe that any useful purpose would be served by voluntarily providing any opportunity to comment on them.

Issued on February 11, 1982.

Raymond A. Peck, Jr.
Administrator

47 F.R. 7253
February 18, 1982

PREAMBLE TO AN AMENDMENT TO PART 571— FEDERAL MOTOR VEHICLE SAFETY STANDARD

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EFFECTIVE DATE: This amendment is effective March 22, 1982.

SUPPLEMENTARY INFORMATION: The Federal Motor Vehicle Safety Standards issued by the agency incorporate by reference a number of standards and test procedures adopted by voluntary standards associations, such as the American Society for Testing and Materials and the Society of Automotive Engineers. The legal effect of incorporation by reference is that the material is treated as if it were published in full in the *Federal Register* and thus has the force and effect of law. The agency only uses incorporation by reference when the referenced material is of a detailed, technical nature and would unnecessarily add to the volume of matter printed in the *Federal Register*. In all instances, the material incorporated by reference is easily available to the public for inspection and copying.

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47 F.R. 7253
February 18, 1982

PART 571—FEDERAL MOTOR VEHICLE SAFETY STANDARDS

SUBPART A—GENERAL

§ 571.1 Scope.

This part contains the Federal Motor Vehicle Safety Standards for motor vehicles and motor vehicle equipment established under section 103 of the National Traffic and Motor Vehicle Safety Act of 1966 (80 Stat. 718).

§ 571.3 Definitions.

(a) *Statutory definitions.* All terms defined in section 102 of the Act are used in their statutory meaning.

(b) *Other definitions.* As used in this chapter “Act” means the National Traffic and Motor Vehicle Safety Act of 1966 (80 Stat. 718).

“Approved,” unless used with reference to another person, means approved by the Secretary.

“Boat trailer” means a trailer designed with cradle-type mountings to transport a boat and configured to permit launching of the boat from the rear of the trailer.

“Bus” means a motor vehicle with motive power, except a trailer designed for carrying more than 10 persons.

“Curb weight” means the weight of a motor vehicle with standard equipment: maximum capacity of engine fuel, oil, and coolant; and, if so equipped, air conditioning and additional weight optional engine.

“Designated seating capacity” means the number of designated seating positions provided.

“Designated seating position” means any plan view location capable of accommodating a person at least as large as a 5th percentile adult female, if the overall seat configuration and design and vehicle design is such that the position is likely to be used as a seating position while the vehicle is in motion, except for auxiliary seating accommodations such as temporary or folding jump seats. Any bench or split-bench seat in a passenger car, truck or multipurpose passenger vehicle with a GVWR less than 10,000 pounds, having greater than 50 inches of hip room (measured in accordance with SAE Standard J1100 (a)) shall have not less than three designated

seating positions, unless the seat design or vehicle design is such that the center position cannot be used for seating.

“Driver” means the occupant of a motor vehicle seated immediately behind the steering control system.

“Emergency brake” means a mechanism designed to stop a motor vehicle after a failure of the service brake.

“5th percentile adult female” means a person possessing the dimensions and weight of the 5th percentile adult female specified for the total age group in Public Health Service Publication No. 1000, Series 11, No. 8, “Weight, Height, and Selected Body Dimensions of Adults.”

“Fixed collision barrier” means a flat, vertical, unyielding surface with the following characteristics:

(1) The surface is sufficiently large that when struck by a tested vehicle, no portion of the vehicle projects or passes beyond the surface.

(2) The approach is a horizontal surface that is large enough for the vehicle to attain a stable attitude during its approach to the barrier, and that does not restrict vehicle motion during impact.

(3) When struck by a vehicle, the surface and its supporting structure absorb no significant portion of the vehicle’s kinetic energy, so that a performance requirement described in terms of impact with a fixed collision barrier must be met no matter how small an amount of energy is absorbed by the barrier.

“Firefighting vehicle” means a vehicle designed exclusively for the purpose of fighting fires.

“Forward control” means a configuration in which more than half of the engine length is rearward of the foremost point of the windshield base and the steering wheel hub is in the forward quarter of the vehicle length.

“Gross axle weight rating” or “GAWR” means the value specified by the vehicle manufacturer as the load-carrying capacity of a single axle system, as measured at the tire-ground interfaces.

“Gross combination weight rating” or “GCWR” means the value specified by the manufacturer as the loaded weight of a combination vehicle.

“Gross vehicle weight rating” or “GVWR” means the value specified by the manufacturer as the loaded weight of a single vehicle.

“H point” means the mechanically hinged hip point of a manikin which simulates the actual pivot center of the human torso and thigh, described in SAE Recommended Practice J826. “Manikin for Use in Defining Vehicle Seating Accommodations,” November 1962.

“Head impact area” means all non-glazed surfaces of the interior of a vehicle that are statically contactable by a 6.5-inch diameter spherical head form of a measuring device having a pivot point to “top-of-head” dimension infinitely adjustable from 29 to 33 inches in accordance with the following procedure, or its graphic equivalent:

(a) At each designated seating position, place the pivot point of the measuring device—

(1) For seats that are adjustable fore and aft, at—

(i) The seating reference point; and

(ii) A point 5 inches horizontally forward of the seating reference point and vertically above the seating reference point an amount equal to the rise which results from a 5-inch forward adjustment of the seat or 0.75 inches; and

(2) For seats that are not adjustable fore and aft, at the seating reference point.

(b) With the pivot point to “top-of-head” dimensions at each value allowed by the device and the interior dimensions of the vehicle, determine all contact points above the lower windshield glass line and forward of the seating reference point.

(c) With the head form at each contact point, and with the device in a vertical position if no contact point exists for a particular adjusted length, pivot the measuring device forward and downward through all arcs in vertical planes to 90° each side of the vertical longitudinal plane through the seating reference point, until the head form contacts an interior surface or until it is tangent to a horizontal point 1 inch above the seating reference point, whichever occurs first.

“Includes” means includes but is not limited to.

“Interior compartment door” means any door in the interior of the vehicle installed by the manufacturer as a cover for storage space normally used for personal effects.

“Longitudinal” or “longitudinally” means parallel to the longitudinal centerline of the vehicle.

“Motorcycle” means a motor vehicle with motive power having a seat or saddle for the use of the rider and designed to travel on not more than three wheels in contact with the ground.

“Motor-driven cycle” means a motorcycle with a motor that produces 5-brake horsepower or less.

“Multipurpose passenger vehicle” means a motor vehicle with motive power, except a trailer, designed to carry 10 persons or less which is constructed either on a truck chassis or with special features for occasional off-road operation.

“Open-body type vehicle” means a vehicle having no occupant compartment top or an occupant compartment top that can be installed or removed by the user at his convenience.

“Outboard designated seating position” means a designated seating position where a longitudinal vertical plane tangent to the outboard side of the seat cushion is less than 12 inches from the innermost point on the inside surface of the vehicle at a height between the seating reference point and the shoulder reference point (as shown in Fig. 1 of Federal Motor Vehicle Safety Standard No. 210) and longitudinally between the front and rear edges of the seat cushion.

“Overall vehicle width” means the nominal design dimension of the widest part of the vehicle, exclusive of signal lamps, marker lamps, outside rearview mirrors, flexible fender extensions, and mud flaps, determined with doors and windows closed and the wheels in the straight-ahead position.

“Parking brake” means a mechanism designed to prevent the movement of a stationary motor vehicle.

“Passenger car” means a motor vehicle with motive power, except a multipurpose passenger vehicle, motorcycle, or trailer designed for carrying 10 persons or less.

“Pelvic impact area” means that area of the door or body side panel adjacent to any outboard designated seating position which is bounded by horizontal planes 7 inches above and 4 inches below the seating reference point and vertical transverse planes 8 inches forward and 2 inches rearward of the seating reference point.

PART 571—FEDERAL MOTOR VEHICLE SAFETY STANDARDS

SUBPART A—GENERAL

§ 571.1 Scope.

This part contains the Federal Motor Vehicle Safety Standards for motor vehicles and motor vehicle equipment established under section 103 of the National Traffic and Motor Vehicle Safety Act of 1966 (80 Stat. 718).

§ 571.3 Definitions.

(a) *Statutory definitions.* All terms defined in section 102 of the Act are used in their statutory meaning.

(b) *Other definitions.* As used in this chapter “Act” means the National Traffic and Motor Vehicle Safety Act of 1966 (80 Stat. 718).

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“Curb weight” means the weight of a motor vehicle with standard equipment: maximum capacity of engine fuel, oil, and coolant; and, if so equipped, air conditioning and additional weight optional engine.

“Designated seating capacity” means the number of designated seating positions provided.

“Designated seating position” means any plan view location capable of accommodating a person at least as large as a 5th percentile adult female, if the overall seat configuration and design and vehicle design is such that the position is likely to be used as a seating position while the vehicle is in motion, except for auxiliary seating accommodations such as temporary or folding jump seats. Any bench or split-bench seat in a passenger car, truck or multipurpose passenger vehicle with a GVWR less than 10,000 pounds, having greater than 50 inches of hip room (measured in accordance with SAE Standard J1100 (a)) shall have not less than three designated

seating positions, unless the seat design or vehicle design is such that the center position cannot be used for seating.

“Driver” means the occupant of a motor vehicle seated immediately behind the steering control system.

“Emergency brake” means a mechanism designed to stop a motor vehicle after a failure of the service brake.

“5th percentile adult female” means a person possessing the dimensions and weight of the 5th percentile adult female specified for the total age group in Public Health Service Publication No. 1000, Series 11, No. 8, “Weight, Height, and Selected Body Dimensions of Adults.”

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(3) When struck by a vehicle, the surface and its supporting structure absorb no significant portion of the vehicle’s kinetic energy, so that a performance requirement described in terms of impact with a fixed collision barrier must be met no matter how small an amount of energy is absorbed by the barrier.

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“Forward control” means a configuration in which more than half of the engine length is rearward of the foremost point of the windshield base and the steering wheel hub is in the forward quarter of the vehicle length.

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(a) At each designated seating position, place the pivot point of the measuring device—

(1) For seats that are adjustable fore and aft, at—

(i) The seating reference point; and

(ii) A point 5 inches horizontally forward of the seating reference point and vertically above the seating reference point an amount equal to the rise which results from a 5-inch forward adjustment of the seat or 0.75 inches; and

(2) For seats that are not adjustable fore and aft, at the seating reference point.

(b) With the pivot point to “top-of-head” dimensions at each value allowed by the device and the interior dimensions of the vehicle, determine all contact points above the lower windshield glass line and forward of the seating reference point.

(c) With the head form at each contact point, and with the device in a vertical position if no contact point exists for a particular adjusted length, pivot the measuring device forward and downward through all arcs in vertical planes to 90° each side of the vertical longitudinal plane through the seating reference point, until the head form contacts an interior surface or until it is tangent to a horizontal point 1 inch above the seating reference point, whichever occurs first.

“Includes” means includes but is not limited to.

“Interior compartment door” means any door in the interior of the vehicle installed by the manufacturer as a cover for storage space normally used for personal effects.

“Longitudinal” or “longitudinally” means parallel to the longitudinal centerline of the vehicle.

“Motorcycle” means a motor vehicle with motive power having a seat or saddle for the use of the rider and designed to travel on not more than three wheels in contact with the ground.

“Motor-driven cycle” means a motorcycle with a motor that produces 5-brake horsepower or less.

“Multipurpose passenger vehicle” means a motor vehicle with motive power, except a trailer, designed to carry 10 persons or less which is constructed either on a truck chassis or with special features for occasional off-road operation.

“Open-body type vehicle” means a vehicle having no occupant compartment top or an occupant compartment top that can be installed or removed by the user at his convenience.

“Outboard designated seating position” means a designated seating position where a longitudinal vertical plane tangent to the outboard side of the seat cushion is less than 12 inches from the innermost point on the inside surface of the vehicle at a height between the seating reference point and the shoulder reference point (as shown in Fig. 1 of Federal Motor Vehicle Safety Standard No. 210) and longitudinally between the front and rear edges of the seat cushion.

“Overall vehicle width” means the nominal design dimension of the widest part of the vehicle, exclusive of signal lamps, marker lamps, outside rearview mirrors, flexible fender extensions, and mud flaps, determined with doors and windows closed and the wheels in the straight-ahead position.

“Parking brake” means a mechanism designed to prevent the movement of a stationary motor vehicle.

“Passenger car” means a motor vehicle with motive power, except a multipurpose passenger vehicle, motorcycle, or trailer designed for carrying 10 persons or less.

“Pelvic impact area” means that area of the door or body side panel adjacent to any outboard designated seating position which is bounded by horizontal planes 7 inches above and 4 inches below the seating reference point and vertical transverse planes 8 inches forward and 2 inches rearward of the seating reference point.

“Pole trailer” means a motor vehicle without motive power designed to be drawn by another motor vehicle and attached to the towing vehicle by means of a reach or pole, or by being boomed or otherwise secured to the towing vehicle, for transporting long or irregularly shaped loads such as poles, pipes, or structural members capable generally of sustaining themselves as beams between the supporting connections.

“School bus” means a bus that is sold, or introduced in interstate commerce, for purposes that include carrying students to and from school or related events, but does not include a bus designed and sold for operation as a common carrier in urban transportation.

“Seating reference point” means the manufacturer’s design reference point which—

(a) Establishes the rearmost normal design driving or riding position of each designated seating position in a vehicle;

(b) Has coordinates established relative to the designed vehicle structure;

(c) Simulates the position of the pivot center of the human torso and thigh; and

(d) Is the reference point employed to position the two dimensional templates described in SAE Recommended Practice J826, “Manikins for Use in Defining Vehicle Seating Accommodations,” November 1962.

“Semitrailer” means a trailer, except a pole trailer, so constructed that a substantial part of its weight rests upon or is carried by another motor vehicle.

“Service brake” means the primary mechanism designed to stop a motor vehicle.

“Speed attainable in 1 mile” means the speed attainable by accelerating at maximum rate from a standing start for 1 mile, on a level surface.

“Speed attainable in 2 miles” means the speed attainable by accelerating at a maximum rate from a standing start for 2 miles, on a level surface.

“Torso line” means the line connecting the “H” point and the shoulder reference point as defined in SAE Recommended Practice J787b, “Motor Vehicle Seat Belt Anchorage,” September 1966.

“Trailer” means a motor vehicle with or without motive power, designed for carrying persons or property and for being drawn by another motor vehicle.

“Trailer converter dolly” means a trailer chassis equipped with one or more axles, a lower half of a fifth wheel and a drawbar.

“Truck” means a motor vehicle with motive power, except a trailer, designed primarily for the transportation of property or special purpose equipment.

“Truck tractor” means a truck designed primarily for drawing other motor vehicles and not so constructed as to carry a load other than a part of the weight of the vehicle and the load so drawn.

“Unloaded vehicle weight” means the weight of a vehicle with maximum capacity of all fluids necessary for operation of the vehicle, but without cargo, occupants, or accessories that are ordinarily removed from the vehicle when they are not in use.

“95th percentile adult male” means a person possessing the dimensions and weight of the 95th percentile adult male specified in Public Health Service Publication No. 1000, Series 11, No. 8, “Weight, Height, and Selected Body Dimensions of Adults.”

【“Vehicle fuel tank capacity” means the tank’s unusable capacity (i.e., the volume of fuel left at the bottom of the tank when the vehicle’s fuel pump can no longer draw fuel from the tank) plus its usable capacity (i.e., the volume of fuel that can be pumped into the tank through the filler pipe with the vehicle on a level surface and with the unusable capacity already in the tank). The term does not include the vapor volume of the tank (i.e., the space above the fuel tank filler neck) nor the volume of the fuel tank filler neck. (47 F.R. 47839—October 28, 1982. Effective: October 28, 1982)】

§ 571.4 Explanation of usage.

The word “any,” used in connection with a range of values or set of items in the requirements, conditions, and procedures of the standards or regulations in this chapter, means generally the totality of the items or values, any one of which may be selected by the Administration for testing, except where clearly specified otherwise.

Examples: “The vehicle shall meet the requirements of S4.1 when tested at any point between 18 and 22 inches above the ground.” This means that the vehicle must be capable of meeting the specified requirements at every point between 18 and 22 inches above the ground. The test in question for a given vehicle may call for a single test (a single impact, for example), but the vehicle must meet the requirement at whatever point the Administration selects, within the specified range.

“Each tire shall be capable of meeting the requirements of this standard when mounted on any rim specified by the manufacturer as suitable for use with that tire.” This means that, where the manufacturer specifies more than one rim as suitable for use with a tire, the tire must meet the requirements with whatever rim the Administration selects from the specified group.

“Any one of the items listed below may, at the option of the manufacturer, be substituted for the hardware specified in S4.1.” Here the wording

clearly indicates that the selection of items is at the manufacturer's option.

§ 571.5 Matter incorporated by reference.

(a) *Incorporation.* There are hereby incorporated, by reference, into this part, all materials referred to in any standard in Subpart B of this part that are not set forth in full in the standard. These materials are thereby made part of this regulation. The Director of the *Federal Register* has approved the materials incorporated by reference. For materials subject to change, only the specific version approved by the Director of the Federal Register and specified in the standard are incorporated. A notice of any change in these materials will be published in the *Federal Register*. As a convenience to the reader, the materials incorporated by reference are listed in the Finding Aid Table found at the end of this volume of the *Code of Federal Regulations*.

(b) *Availability.* The materials incorporated by reference, other than acts of Congress and matter published elsewhere in the *Federal Register*, are available as follows:

(1) *Standards of the Society of Automotive Engineers (SAE).* They are published by the Society of Automotive Engineers, Inc. Information and copies may be obtained by writing to: Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pennsylvania 15096.

(2) *Standards of the American Society for Testing and Materials.* They are published by the American Society for Testing and Materials. Information on copies may be obtained by writing to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania, 19103.

(3) *Standards of the American National Standards Institute.* They are published by the American National Standards Institute. Information and copies may be obtained by writing to: American National Standards Institute, 1430 Broadway, New York, New York 10018.

(4) *Data from the National Health Survey, Public Health Publication No. 1000, Series 11, No. 8.* This is published by the U.S. Department of Health, Education, and Welfare. Copies may be obtained for a price of 35 cents from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402.

[(5) *Test methods of the American Association of Textile Chemists and Colorists.* They are published by the American Association of Textile Chemists and Colorists. Information and copies

can be obtained by writing to: American Association of Textile Chemists and Colorist, Post Office Box 886, Durham, NC. (48 F.R. 30138—June 30, 1983. Effective: July 30, 1983)]

(6) All of the above materials, as well as any other materials incorporated by reference, are available for inspection and copying at the Office of Vehicle Safety Standards, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The materials are also available for inspection and copying at the Office of the Federal Register, 1100 L Street, N.W., Washington, D.C.

§ 571.7 Applicability.

(a) *General.* Except as provided in paragraphs (c) and (d) of this section, each standard set forth in Subpart B of this part applies according to its terms to all motor vehicles or items of motor vehicle equipment the manufacture of which is completed on or after the effective date of the standard.

(b) *Chassis-cabs.* Chassis-cabs, as defined in 371.3(b), manufactured on or after January 1, 1968, shall meet all standards in effect on the date of manufacture of the chassis-cab as are applicable to the principal end use intended by its manufacturer except that where the chassis-cab is equipped with only part and not all of the items of lighting equipment referred to in standard No. 108, it need not meet such standards.

(REVOKED 36 F.R. 7055. EFFECTIVE: 4/14/71)

(c) *Military vehicles.* No standard applies to a vehicle or item of equipment manufactured for, and sold directly to, the Armed Forces of the United States in conformity with contractual specifications.

(d) *Export.* No standard applies to a vehicle or item of equipment in the circumstances provided in section 108(b) (5) of the Act (15 U.S.C. 1397 (b) (5)).

(e) *Combining and new used components.* When a new cab is used in the assembly of a truck, the truck will be considered newly manufactured for purposes of paragraph (a) of this section, the application of the requirements of this chapter, and the Act, unless the engine, transmission, and drive axle(s) (as a minimum) of the assembled vehicle are not new, and at least two of these components were taken from the same vehicle.

(f) *Combining new and used components in trailer manufacture.* When new materials are used in the assembly of a trailer, the trailer will be considered newly manufactured for purposes of paragraph (a) of this section, the application of the

“Pole trailer” means a motor vehicle without motive power designed to be drawn by another motor vehicle and attached to the towing vehicle by means of a reach or pole, or by being boomed or otherwise secured to the towing vehicle, for transporting long or irregularly shaped loads such as poles, pipes, or structural members capable generally of sustaining themselves as beams between the supporting connections.

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(a) Establishes the rearmost normal design driving or riding position of each designated seating position in a vehicle;

(b) Has coordinates established relative to the designed vehicle structure;

(c) Simulates the position of the pivot center of the human torso and thigh; and

(d) Is the reference point employed to position the two dimensional templates described in SAE Recommended Practice J826, “Manikins for Use in Defining Vehicle Seating Accommodations,” November 1962.

“Semitrailer” means a trailer, except a pole trailer, so constructed that a substantial part of its weight rests upon or is carried by another motor vehicle.

“Service brake” means the primary mechanism designed to stop a motor vehicle.

“Speed attainable in 1 mile” means the speed attainable by accelerating at maximum rate from a standing start for 1 mile, on a level surface.

“Speed attainable in 2 miles” means the speed attainable by accelerating at a maximum rate from a standing start for 2 miles, on a level surface.

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“Truck tractor” means a truck designed primarily for drawing other motor vehicles and not so constructed as to carry a load other than a part of the weight of the vehicle and the load so drawn.

“Unloaded vehicle weight” means the weight of a vehicle with maximum capacity of all fluids necessary for operation of the vehicle, but without cargo, occupants, or accessories that are ordinarily removed from the vehicle when they are not in use.

“95th percentile adult male” means a person possessing the dimensions and weight of the 95th percentile adult male specified in Public Health Service Publication No. 1000, Series 11, No. 8, “Weight, Height, and Selected Body Dimensions of Adults.”

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Examples: “The vehicle shall meet the requirements of S4.1 when tested at any point between 18 and 22 inches above the ground.” This means that the vehicle must be capable of meeting the specified requirements at every point between 18 and 22 inches above the ground. The test in question for a given vehicle may call for a single test (a single impact, for example), but the vehicle must meet the requirement at whatever point the Administration selects, within the specified range.

“Each tire shall be capable of meeting the requirements of this standard when mounted on any rim specified by the manufacturer as suitable for use with that tire.” This means that, where the manufacturer specifies more than one rim as suitable for use with a tire, the tire must meet the requirements with whatever rim the Administration selects from the specified group.

“Any one of the items listed below may, at the option of the manufacturer, be substituted for the hardware specified in S4.1.” Here the wording

clearly indicates that the selection of items is at the manufacturer's option.

§ 571.5 Matter incorporated by reference.

(a) *Incorporation.* There are hereby incorporated, by reference, into this part, all materials referred to in any standard in Subpart B of this part that are not set forth in full in the standard. These materials are thereby made part of this regulation. The Director of the *Federal Register* has approved the materials incorporated by reference. For materials subject to change, only the specific version approved by the Director of the Federal Register and specified in the standard are incorporated. A notice of any change in these materials will be published in the *Federal Register*. As a convenience to the reader, the materials incorporated by reference are listed in the Finding Aid Table found at the end of this volume of the *Code of Federal Regulations*.

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§ 571.7 Applicability.

(a) *General.* Except as provided in paragraphs (c) and (d) of this section, each standard set forth in Subpart B of this part applies according to its terms to all motor vehicles or items of motor vehicle equipment the manufacture of which is completed on or after the effective date of the standard.

(b) *Chassis-cabs.* Chassis-cabs, as defined in 371.3(b), manufactured on or after January 1, 1968, shall meet all standards in effect on the date of manufacture of the chassis-cab as are applicable to the principal end use intended by its manufacturer except that where the chassis-cab is equipped with only part and not all of the items of lighting equipment referred to in standard No. 108, it need not meet such standards.

(REVOKED 36 F.R. 7055. EFFECTIVE: 4/14/71)

(c) *Military vehicles.* No standard applies to a vehicle or item of equipment manufactured for, and sold directly to, the Armed Forces of the United States in conformity with contractual specifications.

(d) *Export.* No standard applies to a vehicle or item of equipment in the circumstances provided in section 108(b) (5) of the Act (15 U.S.C. 1397 (b) (5)).

(e) *Combining and new used components.* When a new cab is used in the assembly of a truck, the truck will be considered newly manufactured for purposes of paragraph (a) of this section, the application of the requirements of this chapter, and the Act, unless the engine, transmission, and drive axle(s) (as a minimum) of the assembled vehicle are not new, and at least two of these components were taken from the same vehicle.

(f) *Combining new and used components in trailer manufacture.* When new materials are used in the assembly of a trailer, the trailer will be considered newly manufactured for purposes of paragraph (a) of this section, the application of the

requirements of this chapter, and the Act, unless, at a minimum, the trailer running gear assembly (axle(s), wheels, braking and suspension) is not new, and was taken from an existing trailer—

(1) Whose identity is continued in the reassembled vehicle with respect to the Vehicle Identification Number; and

(2) That is owned or leased by the user of the reassembled vehicle.

§ 571.8 Effective date.

Notwithstanding the effective date provisions of the motor vehicle safety standards in this part, the effective date of any standard or amendment of a standard issued after September 1, 1971, to which firefighting vehicles must conform shall be, with respect to such vehicles, either 2 years after the date on which such standard or amendment is published in the Rules and Regulations section of the *Federal Register*, or the effective date specified in the notice, whichever is later, except as such standard or amendment may otherwise specifically provide with respect to firefighting vehicles.

§ 571.9 Separability.

If any standard established in this part or its application to any person or circumstance is held invalid, the remainder of the part and the application of that standard to other persons or circumstances is not affected thereby.

§ 571.13 Labeling of chassis-cabs.

Each chassis-cab manufactured on or after January 1, 1968, shall, at the time of sale, conspicuously display a label affixed by its manufacturer that—

(a) Identifies it as a chassis-cab and shows the date of manufacture;

(b) Identifies the Federal motor vehicle safety standards with which its manufacturer states the chassis-cab fully complied for the principal end uses of such vehicle; and

(c) States in substance that the chassis-cab may be used on the public highways for the purpose of transit between its manufacturer and subsequent manufacturers (including distribution incidental thereto) and for no other purpose, until such time as the chassis-cab complies with all Federal motor vehicle safety standards applicable to any end use of such vehicle. This provision does not relieve the manufacturer or shipper from any applicable requirement imposed upon such chassis-cabs by Federal, State, or local authority.

Interpretations

General. Compliance with Initial Federal Motor Vehicle Safety Standards is determined by actual date of manufacture, rather than model year designation.

Mini-bikes.

A number of persons have asked the Federal Highway Administrator to reconsider his February 4, 1969 interpretation of the National Traffic and Motor Vehicle Safety Act of 1966 concerning mini-bikes. In that interpretation, the Administrator concluded that mini-bikes are “motor vehicles” within the meaning of section 102(3) of the Act, and are regarded as “motorcycles” or “motor-driven cycles” under the Federal Highway Administration regulations. Under those regulations, motorcycles and motor-driven cycles must conform to Motor Vehicle Safety Standard No. 108, which imposes performance requirements relating to lamps, reflective devices, and associated equipment.

The primary basis for the conclusion of the February 4 interpretation, as stated therein, was that “[i]n the absence of clear evidence that as a practical matter a vehicle is not being, or will not be, used on the public streets, roads, or highways the operating capability of a vehicle is the most relevant fact in determining whether or not that vehicle is a motor vehicle under the Act . . .” It was stated that if examination of a vehicle’s operating capability revealed that the vehicle is “physically capable (either as offered for sale or without major additions or modifications) of being operated on the public streets, roads, or highways, the vehicle will be considered as having been ‘manufactured primarily for use on the public streets, roads, and highways.’” It was also stated that a manufacturer would need to show substantially more than that it has advertised a vehicle as a recreational or private property vehicle or that use of the vehicle on a public roadway, as manufactured and sold, would be illegal in order to overcome a conclusion based on examination of the vehicle’s operating capability.

Petitioners have urged the Administrator to abandon the operating capability test. They have argued that many vehicular types, such as self-propelled riding mowers, have an “operating capability” for use on the public roads and yet are obviously outside the class of vehicles which Congress subjected to safety regulation. True as that may be, the Administrator has decided to adhere to the view that the operating capability of a vehicle is an important criterion in determining

whether it is a "motor vehicle" within the meaning of the statute. As the above-quoted portion of the February 4, 1969 interpretation states, however, the operating capability test is not reached if there is "clear evidence that as a practical matter the vehicle is not being used on the public streets, roads, or highways. In the case of self-propelled riding mowers, golf carts, and many other similar self-propelled vehicles, such clear evidence exists.

It is clear from the definition of "motor vehicle" in section 102(3) of the Act* that the purpose for which a vehicle is manufactured is a basic factor in determining whether it was "manufactured primarily for use on the public streets, roads, and highways." However, this does not mean that the proper classification of a particular vehicle is wholly dependent on the manufacturer's subjective state of mind. Instead, the Administrator intends to invoke the familiar principle that the purpose for which an act, such as the production of a vehicle, is undertaken may be discerned from the actor's conduct in the light of the surrounding circumstances. Thus, if a vehicle is operationally capable of being used on public thoroughfares and if in fact a substantial proportion of the consuming public actually uses it that way, it is a "motor vehicle" without regard to the manufacturer's intent, however manifested. In such a case, it would be incumbent upon a manufacturer of such a vehicle either to alter the vehicle's design, configuration, and equipment to render it unsuitable for on-road use or, by compliance with applicable motor vehicle safety standards, to render the vehicle safe for use on public streets, roads, and highways.

In borderline cases, other factors must also be considered. Perhaps the most important of these is whether state and local laws permit the vehicle in question to be used and registered for use on public highways. The nature of the manufacturer's promotional and marketing activities is also evidence of the use for which the vehicle is manufactured. Some relevant aspects of those activities are: (1) whether the vehicle is advertised for on-road use or whether the manufacturer represents to the public that the vehicle is not for use on public roads; (2) whether the vehicle is sold through retail outlets that also deal in conventional motor vehicles; and

(3) whether the manufacturer affixes a label warning owners of the vehicle not to use it for travel over public roads.

In the first instance, each manufacturer must decide whether his vehicles are manufactured primarily for use on the public streets, roads, and highways. His decision cannot be conclusive, however. Under the law, the authority to determine whether vehicles are subject to the provisions of the National Traffic and Motor Vehicle Safety Act is vested in the Secretary. As delegate of the Secretary, the Administrator will exercise that power in the light of all of the relevant facts and circumstances (including the manufacturer's declaration of his intent) with the objective of reducing the toll of injuries and deaths on the public highways.

Analysis of the available data about mini-bikes, including the contents of petitions for reconsideration of the February 4, 1969 interpretation, has convinced the Administrator that, for the most part, mini-bikes should not be considered motor vehicles under the above criteria. Mini-bikes do have an operating capability for use on public roads. It now appears that incidents of their actual operation on public streets, roads, and highways, while undoubtedly extant, are comparatively rare. What is more important, their use and registration for use on public thoroughfares is precluded by the laws of virtually every jurisdiction, unless the mini-bike is equipped with lamps, reflective devices, and associated equipment of the sort that Safety Standard No. 108 requires. Most manufacturers of mini-bikes do not advertise or otherwise promote them as being suitable for use on public roads, and some actually attach a label to their vehicles, warning against on-road use. Those manufacturers do not furnish retail purchasers with the documentation needed to register, title, and license the vehicles for use on public roads under the relevant State laws. Finally, mini-bikes are commonly sold to the public through retail outlets that are not licensed dealers in motor vehicles.

Accordingly, so long as the great majority of the States do not permit the registration of mini-bikes for use on the public highways and streets, and until such time as there is clear evidence that mini-bikes are being used on public streets to a significant extent, the Administrator is of the view that, at a minimum, persons who manufacture mini-bikes are not manufacturers of "motor vehicles" within the meaning of the National Traffic and Motor Vehicle Safety Act of 1966 if they (1) do not

*" 'Motor vehicle' means any vehicle driven or drawn by mechanical power manufactured primarily for use on the public streets, roads, and highways, except any vehicle operated exclusively on a rail or rails." 15 U.S.C. 1391(3).

requirements of this chapter, and the Act, unless, at a minimum, the trailer running gear assembly (axle(s), wheels, braking and suspension) is not new, and was taken from an existing trailer—

(1) Whose identity is continued in the reassembled vehicle with respect to the Vehicle Identification Number; and

(2) That is owned or leased by the user of the reassembled vehicle.

§ 571.8 Effective date.

Notwithstanding the effective date provisions of the motor vehicle safety standards in this part, the effective date of any standard or amendment of a standard issued after September 1, 1971, to which firefighting vehicles must conform shall be, with respect to such vehicles, either 2 years after the date on which such standard or amendment is published in the Rules and Regulations section of the *Federal Register*, or the effective date specified in the notice, whichever is later, except as such standard or amendment may otherwise specifically provide with respect to firefighting vehicles.

§ 571.9 Separability.

If any standard established in this part or its application to any person or circumstance is held invalid, the remainder of the part and the application of that standard to other persons or circumstances is not affected thereby.

§ 571.13 Labeling of chassis-cabs.

Each chassis-cab manufactured on or after January 1, 1968, shall, at the time of sale, conspicuously display a label affixed by its manufacturer that—

(a) Identifies it as a chassis-cab and shows the date of manufacture;

(b) Identifies the Federal motor vehicle safety standards with which its manufacturer states the chassis-cab fully complied for the principal end uses of such vehicle; and

(c) States in substance that the chassis-cab may be used on the public highways for the purpose of transit between its manufacturer and subsequent manufacturers (including distribution incidental thereto) and for no other purpose, until such time as the chassis-cab complies with all Federal motor vehicle safety standards applicable to any end use of such vehicle. This provision does not relieve the manufacturer or shipper from any applicable requirement imposed upon such chassis-cabs by Federal, State, or local authority.

Interpretations

General. Compliance with Initial Federal Motor Vehicle Safety Standards is determined by actual date of manufacture, rather than model year designation.

Mini-bikes.

A number of persons have asked the Federal Highway Administrator to reconsider his February 4, 1969 interpretation of the National Traffic and Motor Vehicle Safety Act of 1966 concerning mini-bikes. In that interpretation, the Administrator concluded that mini-bikes are “motor vehicles” within the meaning of section 102(3) of the Act, and are regarded as “motorcycles” or “motor-driven cycles” under the Federal Highway Administration regulations. Under those regulations, motorcycles and motor-driven cycles must conform to Motor Vehicle Safety Standard No. 108, which imposes performance requirements relating to lamps, reflective devices, and associated equipment.

The primary basis for the conclusion of the February 4 interpretation, as stated therein, was that “[i]n the absence of clear evidence that as a practical matter a vehicle is not being, or will not be, used on the public streets, roads, or highways the operating capability of a vehicle is the most relevant fact in determining whether or not that vehicle is a motor vehicle under the Act . . .” It was stated that if examination of a vehicle’s operating capability revealed that the vehicle is “physically capable (either as offered for sale or without major additions or modifications) of being operated on the public streets, roads, or highways, the vehicle will be considered as having been ‘manufactured primarily for use on the public streets, roads, and highways’.” It was also stated that a manufacturer would need to show substantially more than that it has advertised a vehicle as a recreational or private property vehicle or that use of the vehicle on a public roadway, as manufactured and sold, would be illegal in order to overcome a conclusion based on examination of the vehicle’s operating capability.

Petitioners have urged the Administrator to abandon the operating capability test. They have argued that many vehicular types, such as self-propelled riding mowers, have an “operating capability” for use on the public roads and yet are obviously outside the class of vehicles which Congress subjected to safety regulation. True as that may be, the Administrator has decided to adhere to the view that the operating capability of a vehicle is an important criterion in determining

whether it is a "motor vehicle" within the meaning of the statute. As the above-quoted portion of the February 4, 1969 interpretation states, however, the operating capability test is not reached if there is "clear evidence that as a practical matter the vehicle is not being used on the public streets, roads, or highways. In the case of self-propelled riding mowers, golf carts, and many other similar self-propelled vehicles, such clear evidence exists.

It is clear from the definition of "motor vehicle" in section 102(3) of the Act* that the purpose for which a vehicle is manufactured is a basic factor in determining whether it was "manufactured primarily for use on the public streets, roads, and highways." However, this does not mean that the proper classification of a particular vehicle is wholly dependent on the manufacturer's subjective state of mind. Instead, the Administrator intends to invoke the familiar principle that the purpose for which an act, such as the production of a vehicle, is undertaken may be discerned from the actor's conduct in the light of the surrounding circumstances. Thus, if a vehicle is operationally capable of being used on public thoroughfares and if in fact a substantial proportion of the consuming public actually uses it that way, it is a "motor vehicle" without regard to the manufacturer's intent, however manifested. In such a case, it would be incumbent upon a manufacturer of such a vehicle either to alter the vehicle's design, configuration, and equipment to render it unsuitable for on-road use or, by compliance with applicable motor vehicle safety standards, to render the vehicle safe for use on public streets, roads, and highways.

In borderline cases, other factors must also be considered. Perhaps the most important of these is whether state and local laws permit the vehicle in question to be used and registered for use on public highways. The nature of the manufacturer's promotional and marketing activities is also evidence of the use for which the vehicle is manufactured. Some relevant aspects of those activities are: (1) whether the vehicle is advertised for on-road use or whether the manufacturer represents to the public that the vehicle is not for use on public roads; (2) whether the vehicle is sold through retail outlets that also deal in conventional motor vehicles; and

(3) whether the manufacturer affixes a label warning owners of the vehicle not to use it for travel over public roads.

In the first instance, each manufacturer must decide whether his vehicles are manufactured primarily for use on the public streets, roads, and highways. His decision cannot be conclusive, however. Under the law, the authority to determine whether vehicles are subject to the provisions of the National Traffic and Motor Vehicle Safety Act is vested in the Secretary. As delegate of the Secretary, the Administrator will exercise that power in the light of all of the relevant facts and circumstances (including the manufacturer's declaration of his intent) with the objective of reducing the toll of injuries and deaths on the public highways.

Analysis of the available data about mini-bikes, including the contents of petitions for reconsideration of the February 4, 1969 interpretation, has convinced the Administrator that, for the most part, mini-bikes should not be considered motor vehicles under the above criteria. Mini-bikes do have an operating capability for use on public roads. It now appears that incidents of their actual operation on public streets, roads, and highways, while undoubtedly extant, are comparatively rare. What is more important, their use and registration for use on public thoroughfares is precluded by the laws of virtually every jurisdiction, unless the mini-bike is equipped with lamps, reflective devices, and associated equipment of the sort that Safety Standard No. 108 requires. Most manufacturers of mini-bikes do not advertise or otherwise promote them as being suitable for use on public roads, and some actually attach a label to their vehicles, warning against on-road use. Those manufacturers do not furnish retail purchasers with the documentation needed to register, title, and license the vehicles for use on public roads under the relevant State laws. Finally, mini-bikes are commonly sold to the public through retail outlets that are not licensed dealers in motor vehicles.

Accordingly, so long as the great majority of the States do not permit the registration of mini-bikes for use on the public highways and streets, and until such time as there is clear evidence that mini-bikes are being used on public streets to a significant extent, the Administrator is of the view that, at a minimum, persons who manufacture mini-bikes are not manufacturers of "motor vehicles" within the meaning of the National Traffic and Motor Vehicle Safety Act of 1966 if they (1) do not

*" 'Motor vehicle' means any vehicle driven or drawn by mechanical power manufactured primarily for use on the public streets, roads, and highways, except any vehicle operated exclusively on a rail or rails." 15 U.S.C. 1391(3).

equip them with devices and accessories that render them lawful for use and registration for use on public highways under state and local laws; (2) do not otherwise participate or assist in making the vehicles lawful for operation on public roads (as by furnishing certificates of origin or other title documents, unless those documents contain a statement that the vehicles were not manufactured for use on public streets, roads, or highways); (3) do not advertise or promote them as vehicles suitable for use on public roads; (4) do not generally market them through retail dealers on motor vehicles; and (5) affix to the mini-bikes a notice stating in substance that the vehicles were not manufactured for use on public streets, roads, or highways and warning operators against such use. Cases of manufacturers who fulfill some, but not all, of the above criteria will be dealt with individually under those criteria and such others as may be relevant.

A manufacturer of mini-bikes is, of course, at liberty to design and construct his products so that they conform to the provisions of the motor vehicle safety standards that are applicable to motorcycles and thereby to manufacture motor vehicles within the meaning of the National Traffic and Motor Vehicle Safety Act.

In consideration of the foregoing, the petitions for reconsideration of the February 4, 1969 interpretation relating to mini-bikes are granted to the extent set forth above, and that interpretation is withdrawn.

Issued on Sept. 30, 1969.

Limits on State Enforcement Procedures

The Japan Automobile Manufacturers Association has brought to the attention of the NHTSA, in a petition for reconsideration of Standard No. 209, some leadtime problems that may be caused by the safety standard enforcement practices of some of the States. These States require manufacturers to submit samples of motor vehicle equipment covered by one of the standards, such as seat belt assemblies, to a State-authorized test laboratory. The test reports from the laboratory are then submitted to a State agency or an outside agency such as the American Association of Motor Vehicle Administrators, which issues an "approval" to the manufacturer. The problem arises in cases where the State does not permit the manufacturer to sell the equipment in that State until the approval is received. If the leadtime between the issuance of a

fairly short, the manufacturer may not have time to prepare and submit samples and to obtain the State-required approval before the effective date of the standard. Thus, the manufacturer may be prohibited from selling his product in the State on and after the effective date, even though it fully complies with all applicable Federal standards and regulations.

The substantive relationship between Federal and State safety standards was established by Congress in section 103(d) of the National Traffic and Motor Vehicle Safety Act, which provides:

"Whenever a Federal motor vehicle safety standard established under this title is in effect, no State or political subdivision of a State shall have any authority either to establish, or to continue in effect, with respect to any motor vehicle or item of motor vehicle equipment any safety standard applicable to the same aspect of performance of such vehicle or item of equipment which is not identical to the Federal Standard."

Although this section makes it clear that State standards must be "identical" to the Federal standards to the extent of the latter's coverage, the procedural relationship between State and Federal enforcement of the standard is not explicitly stated in the Act. It has been the position of this agency that the Act permits the States to enforce the standards, independently of the Federal enforcement effort, since otherwise there would have been no reason for the Act to allow the States to have even "identical" standards. The question raised by the JAMA petition is to what extent the States may utilize an enforcement scheme that differs from the Federal one established by the Act.

The basic structure of the Act places the burden of conformity to the standards on the manufacturers, who must exercise due care to determine that all their products comply with applicable standards (§§ 103, 108, 15 U.S.C. 1392, 1397). They must certify each vehicle and item of covered equipment as conforming to the standards (§ 114, 15 U.S.C. 1403). No prior approval of a manufacturer's products is provided for or contemplated by the Act. The NHTSA does not issue such approvals, but tests the products after they come onto the market to determine whether they conform. Thus, the effective date of a standard is established on the basis of the agency's judgment

as to the length of time it will take manufacturers to design and prepare to produce a vehicle or item of equipment, and is not intended to allow time for obtaining governmental approval after production begins.

In this light, a State requirement of obtaining prior approval before a product may be sold conflicts with the Federal regulatory scheme. The legislative history does not offer specific guidance on the question, except for general statements such as the following by Senator Magnuson:

"Some States have more stringent laws than others, but concerning the car itself we must have uniformity. That is why the bill suggests to States that if we set a minimum standard, *a car complying with such standard should be admitted to all States.*" 112 Cong. Rec. 13585, June 24, 1966.

"[W]e have provided in the bill for foreign cars, that they must comply with the standards: and *we have even allowed them to come in under a free-port arrangement*, where, if they are not in compliance, dealers can bring them up to the standard." 12 Cong. Rec. 13587, June 24, 1966. (Emphasis supplied.)

It is true that Senator Magnuson in the above statements was not directly considering the question of State enforcement. But Congress does not appear to have contemplated the existence of State procedures that would restrict the free movement of vehicles and equipment, or place significant burdens on the manufacturers, in areas covered by the Federal standards, beyond those imposed by the standards themselves.

It is the position of this agency, therefore, that under the Act and the regulatory scheme that has been established by its authority a State may not regulate motor vehicles or motor vehicle equipment, with respect to aspects of performance covered by Federal standards, by requiring prior State approval before sale or otherwise restricting the manufacture, sale, or movement within the State of products that conform to the standards. This interpretation does not preclude State enforcement of standards by other reasonable procedures that do not impose undue burdens on the manufacturers, including submission of products for approval within reasonable time limits, as long as manufacturers are free to market their products while the procedures are being followed, as they are under the Federal scheme.

Issued on May 13, 1971.

equip them with devices and accessories that render them lawful for use and registration for use on public highways under state and local laws; (2) do not otherwise participate or assist in making the vehicles lawful for operation on public roads (as by furnishing certificates of origin or other title documents, unless those documents contain a statement that the vehicles were not manufactured for use on public streets, roads, or highways); (3) do not advertise or promote them as vehicles suitable for use on public roads; (4) do not generally market them through retail dealers on motor vehicles; and (5) affix to the mini-bikes a notice stating in substance that the vehicles were not manufactured for use on public streets, roads, or highways and warning operators against such use. Cases of manufacturers who fulfill some, but not all, of the above criteria will be dealt with individually under those criteria and such others as may be relevant.

A manufacturer of mini-bikes is, of course, at liberty to design and construct his products so that they conform to the provisions of the motor vehicle safety standards that are applicable to motorcycles and thereby to manufacture motor vehicles within the meaning of the National Traffic and Motor Vehicle Safety Act.

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The basic structure of the Act places the burden of conformity to the standards on the manufacturers, who must exercise due care to determine that all their products comply with applicable standards (§§ 103, 108, 15 U.S.C. 1392, 1397). They must certify each vehicle and item of covered equipment as conforming to the standards (§ 114, 15 U.S.C. 1403). No prior approval of a manufacturer's products is provided for or contemplated by the Act. The NHTSA does not issue such approvals, but tests the products after they come onto the market to determine whether they conform. Thus, the effective date of a standard is established on the basis of the agency's judgment

as to the length of time it will take manufacturers to design and prepare to produce a vehicle or item of equipment, and is not intended to allow time for obtaining governmental approval after production begins.

In this light, a State requirement of obtaining prior approval before a product may be sold conflicts with the Federal regulatory scheme. The legislative history does not offer specific guidance on the question, except for general statements such as the following by Senator Magnuson:

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It is the position of this agency, therefore, that under the Act and the regulatory scheme that has been established by its authority a State may not regulate motor vehicles or motor vehicle equipment, with respect to aspects of performance covered by Federal standards, by requiring prior State approval before sale or otherwise restricting the manufacture, sale, or movement within the State of products that conform to the standards. This interpretation does not preclude State enforcement of standards by other reasonable procedures that do not impose undue burdens on the manufacturers, including submission of products for approval within reasonable time limits, as long as manufacturers are free to market their products while the procedures are being followed, as they are under the Federal scheme.

Issued on May 13, 1971.

SECTION TWO—PART 571

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| 102 | Transmission Shift Lever Sequence, Starter Interlock and Transmission Braking Effect | 126 | Truck-Camper Loading |
| 103 | Windshield Defrosting and Defogging Systems | 201 | Occupant Protection in Interior Impact |
| 104 | Windshield Wiping and Washing Systems | 202 | Head Restraints |
| 105 | Hydraulic Brake Systems | 203 | Impact Protection for the Driver From the Steering Control System |
| 106 | Brake Hoses | 204 | Steering Control Rearward Displacement |
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PREAMBLE TO AN AMENDMENT TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 101

Federal Motor Vehicle Safety Standards;
Controls and Displays
[Docket No. 1-18, Notice 25; No. 70-27, Notice 29]

ACTION: Final rule.

SUMMARY: Standard No. 101, *Controls and Displays*, specifies requirements for the accessibility, identification and illumination of controls and displays in passenger cars, trucks, and buses. This notice amends several of the identification requirements of the standard to improve safety by providing easily recognizable, international symbols and to relieve unnecessary restrictions on manufacturers by providing additional flexibility in their ability to identify controls and displays. This notice also responds to manufacturer petitions. The amendments include replacing the symbol specified for headlamp/tail lamp controls that are part of master lighting switches with the International Standards Organization (ISO) master lighting switch symbol, while making the identification for headlamp/tail lamp controls that are separate from master lighting switches at the option of the manufacturer; making a minor modification in the symbol specified for the clearance lamp system control; permitting several symbols to be used in solid or outline form; specifying that horn controls, with limited exceptions, be identified by the ISO horn symbol; permitting several heating and air conditioning controls to be identified by symbols as an alternative to words, with the choice of the particular symbols left to the discretion of the manufacturer; and making minor interpretive amendments. This notice also makes minor interpretive amendments in related identification requirements of Standard No. 105, *Hydraulic Brake Systems*.

EFFECTIVE DATE: The amendments are effective on July 27, 1984. Some amendments are of an

optional nature. Others are optional now and become mandatory on September 1, 1987.

SUPPLEMENTARY INFORMATION: Standard No. 101, *Controls and Displays*, specifies requirements for the accessibility, identification and illumination of controls and displays in passenger cars, multipurpose passenger vehicles, trucks and buses. The purpose of the standard is to ensure the accessibility and visibility of motor vehicle controls and displays to a driver and to facilitate their quick and proper identification and selection by a driver in order to reduce the safety hazards caused by the diversion of the driver's attention from the driving task, and by mistakes in selecting controls.

On November 4, 1982, NHTSA published (47 FR 49993) a notice of proposed rulemaking (NPRM) to update Standard No. 101 by adding or modifying several symbols to bring the standard into harmony with recent documents promulgated by the International Standards Organization (ISO). The agency also proposed minor interpretive amendments. The November 1982 notice was issued in light of changing international standards specifying symbols for the identification of controls and displays. These standards include, in addition to the ISO standard, those of the United Nations Economic Commission for Europe (ECE) and the European Economic Community (EEC). The proposal resulted in part from a petition for rulemaking submitted by Renault.

NHTSA received numerous comments on the proposal, mostly from manufacturers. Since issuing the NPRM, the agency has received several other petitions for rulemaking from manufacturers concerning Standard No. 101, some of which followed directly from the proposal. During the

same time period, the agency has also been in the process of considering comments and related petitions concerning a separate earlier NPRM to amend other aspects (other than specific symbol identification) of Standard No. 101. That proposal was published in the Federal Register (47 FR 4541) on February 1, 1982.

The various comments and petitions relating to one or the other proposal raise a number of issues, many of which are closely interrelated. After reviewing all of the comments and petitions, NHTSA has decided to adopt certain limited amendments at this time from the November 1982 NPRM. This action will enable manufacturers to appropriately, and in a timely fashion, identify their controls and displays while maintaining and improving safety by adopting internationally accepted symbols for identifying these devices. The agency is postponing a final decision on the rest of the amendments proposed by the two notices pending completion of an ongoing examination by the agency of issues related to Standard No. 101. This examination is expected to be complete this summer. Although this examination will broadly cover the requirements of Standard No. 101, it is anticipated to result in a Notice of Proposed Rulemaking, final action on which will not be timely to respond to the immediate needs of the manufacturers and the public. Thus, issuance of this final rule is necessary at this time.

The amendments adopted at this time include: (1) replacing the symbol specified for headlamp/tail lamp controls that are part of master lighting switches with the ISO master lighting switch symbol, while making the required identification for headlamp/tail lamp controls that are separate from master lighting switches at the option of the manufacturer, (2) making a minor modification in the symbol specified for the clearance lamp system control, (3) permitting several symbols to be used in solid or outline form, (4) specifying that horn controls, with limited exceptions, be identified by the ISO horn symbol, (5) permitting heating and air conditioning controls to be identified by symbols as an alternative to words, with the symbols at the option of the manufacturer, and (6) making minor interpretive amendments.

As discussed below, the effective date for certain new or changed symbols is September 1, 1987. An immediate effective date is established for optional use of the new or changed symbols and for the other amendments, all of which are of an optional nature.

The discussion of issues and comments which follows is largely limited to those relating to the amendments adopted by this notice. Remaining issues will be addressed after the agency has completed its comprehensive examination of issues related to Standard No. 101.

Symbol Requirements

The November 1982 notice explained that Standard No. 101 specifies the mandatory use of certain symbols for the identification of a number of controls and displays. Additional words and symbols are permitted to be used for purposes of increasing clarity of the identification. (Standard No. 101 requires several other controls and displays, for which symbols are not specified, to be identified by words. Also, the use of words instead of symbols is permitted in informational readout displays.) The symbols specified by the standard are those developed by the International Standards Organization or similar symbols based on ISO standards. In the notice adopting the use of these symbols (43 FR 27541, June 26, 1978), the agency explained that the rationale for requiring symbols was that they can convey information more quickly and with less chance of human error than words. The agency noted that this was particularly true with respect to the large foreign language speaking population of this country. The agency also indicated that an additional benefit was that manufacturers which sell vehicles both in and outside of the United States could realize cost savings by utilizing internationally acceptable symbols.

As noted above, the November 1982 notice proposed to update Standard No. 101 by adding or modifying several symbols to bring the standard into harmony with the latest documents promulgated by the ISO. The agency stated that the changes would reduce compliance costs by promoting international harmonization and would result in safety benefits.

Almost all of the comments supported the concept of changing Standard No. 101 to facilitate international harmonization. The comments were mixed, however, with respect to some of the specific proposed amendments, especially to the extent that the number of required symbols would be increased.

While some manufacturers strongly supported the amendments essentially as proposed, others questioned the underlying safety need for the standard's requirement for symbols. Concern was expressed by some manufacturers that an increased

PREAMBLE TO AN AMENDMENT TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 101

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Controls and Displays
[Docket No. 1-18, Notice 25; No. 70-27, Notice 29]

ACTION: Final rule.

SUMMARY: Standard No. 101, *Controls and Displays*, specifies requirements for the accessibility, identification and illumination of controls and displays in passenger cars, trucks, and buses. This notice amends several of the identification requirements of the standard to improve safety by providing easily recognizable, international symbols and to relieve unnecessary restrictions on manufacturers by providing additional flexibility in their ability to identify controls and displays. This notice also responds to manufacturer petitions. The amendments include replacing the symbol specified for headlamp/tail lamp controls that are part of master lighting switches with the International Standards Organization (ISO) master lighting switch symbol, while making the identification for headlamp/tail lamp controls that are separate from master lighting switches at the option of the manufacturer; making a minor modification in the symbol specified for the clearance lamp system control; permitting several symbols to be used in solid or outline form; specifying that horn controls, with limited exceptions, be identified by the ISO horn symbol; permitting several heating and air conditioning controls to be identified by symbols as an alternative to words, with the choice of the particular symbols left to the discretion of the manufacturer; and making minor interpretive amendments. This notice also makes minor interpretive amendments in related identification requirements of Standard No. 105, *Hydraulic Brake Systems*.

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NHTSA received numerous comments on the proposal, mostly from manufacturers. Since issuing the NPRM, the agency has received several other petitions for rulemaking from manufacturers concerning Standard No. 101, some of which followed directly from the proposal. During the

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While some manufacturers strongly supported the amendments essentially as proposed, others questioned the underlying safety need for the standard's requirement for symbols. Concern was expressed by some manufacturers that an increased

number of required symbols could result in greater risk of producing non-conforming vehicles, with the possibility of having to recall vehicles.

General Motors expressed concern that either requiring an overabundance of symbols, or requiring symbols that offer no intuitive recognizability, would not be in the best interests of its customers or the marketability of its products. That company stated that while the existing set of required symbols does not present a significant problem, the addition of more mandatory symbols could lead to increased customer resistance and driver confusion. On this last point, General Motors stated that the symbols most recently adopted by the ISO have been adopted without testing to assure immediate recognizability, with a greater probability that the meaning of the symbols must be learned.

The agency agrees that too many symbols, or symbols that are not easily recognizable, are not in the public's or industry's interest. For this reason, the agency has postponed action on some of the additional requirements proposed in the November 1982 notice. These will be addressed in the agency's forthcoming evaluating of Standard No. 101. Thus, this final rule adds one completely new symbol (the horn symbol) to the standard and changes or modifies several others. The agency believes, based on the comments to the docket and the work of the ISO, that each of the new and modified symbols is easily recognizable. The agency also believes that the amendments will not create confusion or any other problems related to a possible "overabundance" of symbols, because of their limited nature. The agency will consider the broader issues of possible "overabundance" of symbols and of new symbols which may not offer intuitive recognizability as part of its comprehensive examination of Standard No. 101 issues.

Master Lighting Switch Symbol

As explained in the November 1982 notice, the proposal to replace the symbol specified for the headlamp/tail lamp control with the master lighting symbol resulted in part from a petition for rulemaking submitted by Renault. Renault's petition had pointed out that the symbol specified by Standard No. 101 for that control is different from that used elsewhere in the world. That petitioner noted that the Standard No. 101 symbol is that designated by the ISO for high beam headlamps, rather than for the headlamp/tail lamp control.

Most of the commenters supported changing to the master lighting symbol. General Motors stated that it supports the proposal to revise the symbols for those control and display functions which already require identification in order to bring them into harmonization with European requirements, including replacing the headlamp symbol with the master lighting symbol. Several other manufacturer comments specifically supported the change.

Renault stated that while it approves without reservation the introduction of the master lighting symbol into the standard, the list of functions corresponding to the symbol given in column 1 of Table 1 should be expanded or at best omitted altogether. The proposed wording in column 1 referred to by Renault was "Master Lighting Switch, Headlamp and Tail Lamps."

One commenter, Grumman Flexible, disagreed with changing to the master lighting symbol. That company argued that the symbol is too ambiguous, does not specifically indicate that the lamps it represents include headlamps, and also represents additional components not specifically indicated. Grumman Flexible also argued that the symbol is not immediately recognizable, due to both an initial unfamiliarity with the symbol in this country and because the pictogram is too abstract in nature. That commenter also stated that the symbol does not allow for any distinction between the headlamp mode and parking light mode, and that that issue should be addressed. Finally, Grumman Flexible stated that it finds no evidence that the symbol is used by the rest of the world for headlamps and that most foreign vehicles it is familiar with use the current Standard No. 101 headlamp symbol.

Fiat stated that identification for the headlamp control has been omitted from Table 1. According to that commenter, the headlamp symbol should be required for the identification of the high beam/low beam switch if this is separate from the master lighting switch.

This notice adopts the master lighting switch symbol for headlamp/tail lamp controls that are also master lighting switches, i.e., single controls that operate several different lamp systems. The agency continues to require identification of headlamp/tail lamp controls that are separate from the master lighting switch. However, the agency has decided that the method of identifying headlamp/tail lamp controls should be at the option of the manufacturer.

Standard No. 101 currently specifies the same symbol for headlamp/tail lamp controls whether or not such controls are also master lighting switches. The description of the control designated in column 1 of Table 1 is "Headlamps and Tail Lamps." A footnote indicates that the symbol must also be used when clearance, identification, parking and/or side marker lamps are controlled with the headlamp switch. The type of control described by the footnote is a master lighting switch. Typical passenger cars, as well as many other vehicles, have master lighting switches instead of separate controls for various types of lamps.

The November 1982 notice proposed the use of the master lighting switch symbol for both master lighting switches and separate headlamp/tail lamp controls. The proposed description for column 1 of Table 1 referred to by Renault, "Master Lighting Switch, Headlamp and Tail Lamps", indicated that the symbol was to apply to both types of controls. Thus, the words "Headlamp and Tail Lamps" were not intended to be a list of functions corresponding to the master lighting switch.

The agency believes that the master lighting switch symbol is the most appropriate and easily recognizable symbol to identify master lighting switches. The agency does not agree with Grumman Flxible that the symbol is not immediately recognizable or that the pictogram is too abstract. The symbol in question obviously resembles a light bulb with lines representing rays of light going out in all directions. Since the control operates several different lamps, typically including at least headlamps and tail lamps, parking lamps and side marker lamps, the agency considers such a general lighting symbol to be more appropriate than one which more specifically indicates a single particular type of lamp, i.e., headlamps. With regard to Grumman Flxible's statement that the symbol does not allow for any distinction between the headlamp mode and parking mode, the agency notes that Standard No. 101 permits the use of words or symbols in addition to those required, for purposes of clarity. Thus, a manufacturer may, but is not required to, use such words or symbols to distinguish between different modes.

The agency does not understand Grumman Flxible's statement that it finds no evidence that the symbol is used by the rest of the world for headlamps and that most foreign vehicles it is familiar with use the current Standard No. 101 headlamp symbol. The master lighting switch symbol is

specified by both the ISO and European Economic Community and is required for vehicles produced for sale in the European market.

The agency has decided that it would not be appropriate to require the master lighting switch symbol to be used for headlamp/tail lamp controls that are separate from a master lighting switch. The general master lighting switch symbol could be confusing in such instances. For example, a driver might see the master lighting switch symbol and believe that it operated all of the vehicle's lamps instead of only the headlamps. Also, identification which more specifically indicates headlamps, such as the symbols specified by the ISO, might be more appropriate. The agency has decided that identification should continue to be required for a separate headlamp/tail lamp control and has therefore included that control in Table 1. The agency has decided, however, that the specific identification for such a control should be at the option of the manufacturer.

Clearance Lamp Symbol

The November 1982 notice proposed a minor modification in the symbol specified for the clearance lamp system control. The notice also proposed a change in the applicability of the symbol to identification lamp and side marker lamp controls.

The notice explained that there are three very similar versions of this symbol. The reason for the multiple versions appears to be that the symbol was still under consideration by the ISO when the United States and Europe established their identification requirements, and it was not clear which specific symbol would be adopted. The agency proposed in November 1982 deleting the version currently included in Standard No. 101 and adopting the version finally specified by the ISO in the interests of cost minimization through harmonization. That is the same version specified by the European Economic Community (EEC). The third version is specified by the United Nations Economic Commission for Europe (ECE). The agency explained that, as essentially the same symbol, all three versions are equally effective at presenting their message. The agency added, however, that for purposes of optimal driver recognition and cost minimization through international harmonization, it believed that it was desirable to specify the use of only one of the three versions.

Several manufacturer commenters agreed that the ISO/EEC version should be specified by

number of required symbols could result in greater risk of producing non-conforming vehicles, with the possibility of having to recall vehicles.

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Most of the commenters supported changing to the master lighting symbol. General Motors stated that it supports the proposal to revise the symbols for those control and display functions which already require identification in order to bring them into harmonization with European requirements, including replacing the headlamp symbol with the master lighting symbol. Several other manufacturer comments specifically supported the change.

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One commenter, Grumman Flexible, disagreed with changing to the master lighting symbol. That company argued that the symbol is too ambiguous, does not specifically indicate that the lamps it represents include headlamps, and also represents additional components not specifically indicated. Grumman Flexible also argued that the symbol is not immediately recognizable, due to both an initial unfamiliarity with the symbol in this country and because the pictogram is too abstract in nature. That commenter also stated that the symbol does not allow for any distinction between the headlamp mode and parking light mode, and that that issue should be addressed. Finally, Grumman Flexible stated that it finds no evidence that the symbol is used by the rest of the world for headlamps and that most foreign vehicles it is familiar with use the current Standard No. 101 headlamp symbol.

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This notice adopts the master lighting switch symbol for headlamp/tail lamp controls that are also master lighting switches, i.e., single controls that operate several different lamp systems. The agency continues to require identification of headlamp/tail lamp controls that are separate from the master lighting switch. However, the agency has decided that the method of identifying headlamp/tail lamp controls should be at the option of the manufacturer.

Standard No. 101 currently specifies the same symbol for headlamp/tail lamp controls whether or not such controls are also master lighting switches. The description of the control designated in column 1 of Table 1 is "Headlamps and Tail Lamps." A footnote indicates that the symbol must also be used when clearance, identification, parking and/or side marker lamps are controlled with the headlamp switch. The type of control described by the footnote is a master lighting switch. Typical passenger cars, as well as many other vehicles, have master lighting switches instead of separate controls for various types of lamps.

The November 1982 notice proposed the use of the master lighting switch symbol for both master lighting switches and separate headlamp/tail lamp controls. The proposed description for column 1 of Table 1 referred to by Renault, "Master Lighting Switch, Headlamp and Tail Lamps", indicated that the symbol was to apply to both types of controls. Thus, the words "Headlamp and Tail Lamps" were not intended to be a list of functions corresponding to the master lighting switch.

The agency believes that the master lighting switch symbol is the most appropriate and easily recognizable symbol to identify master lighting switches. The agency does not agree with Grumman Flxible that the symbol is not immediately recognizable or that the pictogram is too abstract. The symbol in question obviously resembles a light bulb with lines representing rays of light going out in all directions. Since the control operates several different lamps, typically including at least headlamps and tail lamps, parking lamps and side marker lamps, the agency considers such a general lighting symbol to be more appropriate than one which more specifically indicates a single particular type of lamp, i.e., headlamps. With regard to Grumman Flxible's statement that the symbol does not allow for any distinction between the headlamp mode and parking mode, the agency notes that Standard No. 101 permits the use of words or symbols in addition to those required, for purposes of clarity. Thus, a manufacturer may, but is not required to, use such words or symbols to distinguish between different modes.

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The November 1982 notice proposed a minor modification in the symbol specified for the clearance lamp system control. The notice also proposed a change in the applicability of the symbol to identification lamp and side marker lamp controls.

The notice explained that there are three very similar versions of this symbol. The reason for the multiple versions appears to be that the symbol was still under consideration by the ISO when the United States and Europe established their identification requirements, and it was not clear which specific symbol would be adopted. The agency proposed in November 1982 deleting the version currently included in Standard No. 101 and adopting the version finally specified by the ISO in the interests of cost minimization through harmonization. That is the same version specified by the European Economic Community (EEC). The third version is specified by the United Nations Economic Commission for Europe (ECE). The agency explained that, as essentially the same symbol, all three versions are equally effective at presenting their message. The agency added, however, that for purposes of optimal driver recognition and cost minimization through international harmonization, it believed that it was desirable to specify the use of only one of the three versions.

Several manufacturer commenters agreed that the ISO/EEC version should be specified by

Standard No. 101. Some commenters stated that the ECE version should not be permitted as an alternative, since it would be contrary to the anticipated goal of harmonization. It was also pointed out that the ECE version is in a draft regulation and may not be finally adopted by that organization.

GM agreed that it is desirable to have one symbol ultimately prevail and suggested that NHTSA work within the ECE to resolve differences. GM argued, however, that resolving the differences is a harmonization issue rather than a safety issue and suggested that all three versions be permitted in the meantime. GM commented that all three versions are reasonably recognizable and similar enough in form that confusion should not result. Volkswagen similarly commented that the versions are virtually identical.

While it is true that the three versions are similar, the agency believes that for purposes of easy recognition only one should be specified. The leadtime provided by this notice gives adequate time for manufacturers to make the very minor changes necessitated by adoption of the ISO version, as proposed.

Grumman Flxible suggested that the ECE symbol for parking lights be adopted in place of the clearance lamp symbol. (The ECE symbol is the same as the ISO symbol.) That commenter appeared to believe that the clearance lamp symbol must be used for the master lighting switch when it is adjusted so that all lights except the headlamps are on, or for a separate parking light control. The clearance lamp symbol need not be used in either instance. The clearance lamp symbol is only specified for a separate control for identification, side marker and/or clearance lamps. As indicated above, manufacturers may, but need not, supplement the master lighting switch symbol with additional symbols to identify the lights operated by the different adjustment positions of that switch. Thus, a manufacturer could use the ISO parking light symbol, not specified by Standard No. 101, for a particular position of a master lighting switch. Similarly, since Standard No. 101 does not specify identification for a separate parking light control, a manufacturer could use the ISO parking light symbol to identify such a control.

As noted above, the agency also proposed a change in the applicability of the symbol to identification lamp and side marker lamp controls. Standard No. 101 currently specifies the symbol for clearance lamp controls, with a footnote in

Table 1 indicating that the symbol should also be used when clearance lamps, identification lamps, and/or side marker lamps are controlled with one switch other than the headlamp switch. No symbols are specified for identification of separate controls for identification lamps or side marker lamps. The notice proposed that the symbol be specified for all controls operating these three types of lamps, except for a master lighting switch. This notice adopts the amendment as proposed. If separate controls are provided for these types of lamps, a manufacturer may use additional words or symbols for purposes of clarity.

Shading of Symbols

Tables 1 and 2 of Standard No. 101 include footnotes that permit framed areas of certain symbols to be filled in. Recently, the ISO adopted variants of certain other symbols to essentially permit solid areas of those symbols to be in outline form. The November 1982 notice requested comments on whether manufacturers should be permitted to use those variant symbols. All of the comments received on this issue supported allowing the variant symbols. Some commenters stated that the ISO symbols shown in outline form are sufficiently recognizable.

The agency agrees that the outline symbols are recognizable. Therefore, this notice permits those variant symbols to be used for the heating and/or air conditioning fan, the seat belt telltale, and fuel level.

Horn Control

In proposing a requirement that the horn control be identified, the November 1982 notice explained that NHTSA has received a number of complaints over the years about difficulty in locating the horn, especially in panic situations. The agency noted that since location of the horn is not standardized either by industry practice or by regulation, identification of the horn can provide important safety benefits at a minimal cost. The agency proposed that horn controls be identified by the ISO horn symbol, which is a picture of a horn (or bugle).

Comments received on this issue were mixed. Some manufacturers supported the horn requirement essentially as proposed. Several manufacturers stated that identification is unnecessary when the horn is located in the usual place, i.e., on or near the steering wheel. Also, as indicated

above, some manufacturers opposed any expansion of Standard No. 101's requirements.

This notice adopts the requirement that the horn control be identified by the ISO horn symbol, with limited exceptions discussed below. The horn is an important device in accident avoidance. Accordingly, the agency believes it is essential that drivers be able to quickly locate the horn control. In adopting this symbol, the agency concludes that it is clearly and intuitively recognizable.

For other than heavy duty vehicles, the agency does not agree that identification is unnecessary when the horn control is located on or near the steering wheel. First, horn control location within the steering wheel area may vary significantly from vehicle to vehicle, making it difficult to find the horn control in an emergency situation. Second, to the extent that manufacturers locate the horn control elsewhere, e.g., on various stalks, drivers are less likely to expect the horn in what was once the traditional location. Moreover, the absence of a horn symbol in the steering wheel area will alert drivers to look elsewhere. Finally, controls other than the horn, such as a cruise control, may be located on or near the steering wheel, making it more difficult to find a horn control in that same general area.

Some commenters expressed concern about how Standard No. 101's requirement that symbols be perceptually upright might apply to horn controls located on the steering wheel. It was noted that it is impossible for these horn symbols to be perceptually upright at all times. In response to these comments, the agency has included a provision that the horn symbol need be perceptually upright only when the vehicle, aligned to the manufacturer's specification, has its wheels positioned for the vehicle to travel straight forward, i.e., when the steering wheel is centered.

Volkswagen stated that the horns on some of its vehicles are actuated by pressing virtually anywhere on a large, cushioned pad extending over almost the entire area inside the steering wheel. That commenter stated that the proposal was unclear where a horn symbol should be placed in that situation. The agency does not agree that this is unclear. Standard No. 101 generally provides that the identification for controls be placed on or adjacent to the control. Accordingly, Volkswagen could place a single horn symbol anywhere on or adjacent to the cushioned pad.

The November 1982 notice proposed to exclude

narrow ring-type horn controls from the identification requirement since there may not be sufficient space on or adjacent to such controls for the horn symbol. One commenter pointed out that the requirements of Standard No. 203, *Impact protection for the driver from the steering control system*, have largely eliminated that type of control. That standard requires that the steering control system be constructed so that no components or attachments, including horn actuating mechanisms, can catch the driver's clothing or jewelry during normal driving maneuvers. While some ring-type horn control designs are prohibited by that requirement since they can catch the driver's clothing or jewelry during normal driving maneuvers, other designs do not have that problem. The agency has therefore adopted that proposed exclusion.

Several manufacturers commented that most heavy duty vehicles, unlike passenger cars, have both a standard horn and an air horn. The air horn is typically activated by pulling on a lanyard, i.e., chain, cable or rope, above the driver's head. According to these commenters, placing a symbol on such a device would be difficult due to the small area of the lanyard. These commenters also stated that identification of such horns is unnecessary since professional heavy duty vehicle operators are familiar with this type of control. These commenters also argued that the location of the standard (electric) horn on these vehicles is standardized in the center of the steering wheel hub and that identification of these horns is also unnecessary.

The agency agrees with these commenters concerning air horns and has excluded lanyard-operated horns from Standard No. 101's identification requirements. The agency also agrees with the commenters concerning electric horns in heavy duty vehicles. Manufacturers of those vehicles have traditionally placed the electric horn in the center of the steering wheel hub and the agency therefore sees no need to regulate in this area.

Heating and Air Conditioning Controls

Standard No. 101 currently requires identification for each function of any heating and air conditioning control, and for the extreme positions of any such control that regulates a function over a quantitative range. If a symbol is not specified by the standard for such a function, the identification must be in word form (unless color coding is used.)

Standard No. 101. Some commenters stated that the ECE version should not be permitted as an alternative, since it would be contrary to the anticipated goal of harmonization. It was also pointed out that the ECE version is in a draft regulation and may not be finally adopted by that organization.

GM agreed that it is desirable to have one symbol ultimately prevail and suggested that NHTSA work within the ECE to resolve differences. GM argued, however, that resolving the differences is a harmonization issue rather than a safety issue and suggested that all three versions be permitted in the meantime. GM commented that all three versions are reasonably recognizable and similar enough in form that confusion should not result. Volkswagen similarly commented that the versions are virtually identical.

While it is true that the three versions are similar, the agency believes that for purposes of easy recognition only one should be specified. The leadtime provided by this notice gives adequate time for manufacturers to make the very minor changes necessitated by adoption of the ISO version, as proposed.

Grumman Flxible suggested that the ECE symbol for parking lights be adopted in place of the clearance lamp symbol. (The ECE symbol is the same as the ISO symbol.) That commenter appeared to believe that the clearance lamp symbol must be used for the master lighting switch when it is adjusted so that all lights except the headlamps are on, or for a separate parking light control. The clearance lamp symbol need not be used in either instance. The clearance lamp symbol is only specified for a separate control for identification, side marker and/or clearance lamps. As indicated above, manufacturers may, but need not, supplement the master lighting switch symbol with additional symbols to identify the lights operated by the different adjustment positions of that switch. Thus, a manufacturer could use the ISO parking light symbol, not specified by Standard No. 101, for a particular position of a master lighting switch. Similarly, since Standard No. 101 does not specify identification for a separate parking light control, a manufacturer could use the ISO parking light symbol to identify such a control.

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Table 1 indicating that the symbol should also be used when clearance lamps, identification lamps, and/or side marker lamps are controlled with one switch other than the headlamp switch. No symbols are specified for identification of separate controls for identification lamps or side marker lamps. The notice proposed that the symbol be specified for all controls operating these three types of lamps, except for a master lighting switch. This notice adopts the amendment as proposed. If separate controls are provided for these types of lamps, a manufacturer may use additional words or symbols for purposes of clarity.

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Tables 1 and 2 of Standard No. 101 include footnotes that permit framed areas of certain symbols to be filled in. Recently, the ISO adopted variants of certain other symbols to essentially permit solid areas of those symbols to be in outline form. The November 1982 notice requested comments on whether manufacturers should be permitted to use those variant symbols. All of the comments received on this issue supported allowing the variant symbols. Some commenters stated that the ISO symbols shown in outline form are sufficiently recognizable.

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above, some manufacturers opposed any expansion of Standard No. 101's requirements.

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For other than heavy duty vehicles, the agency does not agree that identification is unnecessary when the horn control is located on or near the steering wheel. First, horn control location within the steering wheel area may vary significantly from vehicle to vehicle, making it difficult to find the horn control in an emergency situation. Second, to the extent that manufacturers locate the horn control elsewhere, e.g., on various stalks, drivers are less likely to expect the horn in what was once the traditional location. Moreover, the absence of a horn symbol in the steering wheel area will alert drivers to look elsewhere. Finally, controls other than the horn, such as a cruise control, may be located on or near the steering wheel, making it more difficult to find a horn control in that same general area.

Some commenters expressed concern about how Standard No. 101's requirement that symbols be perceptually upright might apply to horn controls located on the steering wheel. It was noted that it is impossible for these horn symbols to be perceptually upright at all times. In response to these comments, the agency has included a provision that the horn symbol need be perceptually upright only when the vehicle, aligned to the manufacturer's specification, has its wheels positioned for the vehicle to travel straight forward, i.e., when the steering wheel is centered.

Volkswagen stated that the horns on some of its vehicles are actuated by pressing virtually anywhere on a large, cushioned pad extending over almost the entire area inside the steering wheel. That commenter stated that the proposal was unclear where a horn symbol should be placed in that situation. The agency does not agree that this is unclear. Standard No. 101 generally provides that the identification for controls be placed on or adjacent to the control. Accordingly, Volkswagen could place a single horn symbol anywhere on or adjacent to the cushioned pad.

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narrow ring-type horn controls from the identification requirement since there may not be sufficient space on or adjacent to such controls for the horn symbol. One commenter pointed out that the requirements of Standard No. 203, *Impact protection for the driver from the steering control system*, have largely eliminated that type of control. That standard requires that the steering control system be constructed so that no components or attachments, including horn actuating mechanisms, can catch the driver's clothing or jewelry during normal driving maneuvers. While some ring-type horn control designs are prohibited by that requirement since they can catch the driver's clothing or jewelry during normal driving maneuvers, other designs do not have that problem. The agency has therefore adopted that proposed exclusion.

Several manufacturers commented that most heavy duty vehicles, unlike passenger cars, have both a standard horn and an air horn. The air horn is typically activated by pulling on a lanyard, i.e., chain, cable or rope, above the driver's head. According to these commenters, placing a symbol on such a device would be difficult due to the small area of the lanyard. These commenters also stated that identification of such horns is unnecessary since professional heavy duty vehicle operators are familiar with this type of control. These commenters also argued that the location of the standard (electric) horn on these vehicles is standardized in the center of the steering wheel hub and that identification of these horns is also unnecessary.

The agency agrees with these commenters concerning air horns and has excluded lanyard-operated horns from Standard No. 101's identification requirements. The agency also agrees with the commenters concerning electric horns in heavy duty vehicles. Manufacturers of those vehicles have traditionally placed the electric horn in the center of the steering wheel hub and the agency therefore sees no need to regulate in this area.

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Standard No. 101 currently specifies symbols for several functions of a heating and air conditioning system, including the fan, defrosting and defogging, and rear window defrosting and defogging. The November 1982 NPRM proposed to add several ISO symbols to cover additional functions, including heating, air conditioning, various types of vents, and heated seat.

The agency received numerous comments which were opposed to adding these symbols to Standard No. 101. Some commenters stated that the symbols in question were inexplicit and had been adopted hastily by the ISO, without testing for recognizability. According to some commenters, there are efforts within the ISO to change the symbols. Concern was also expressed that the symbols are difficult to apply to many of the complex heating and air conditioning systems in use today or planned for the future. Several manufacturers submitted drawings of heating and air conditioning systems to illustrate the problems associated with the application of the proposed symbols. GM stated that questions of interpretation raise the concern that these particular proposed changes are not objective, since manufacturers would not have the requisite assurance that they have met the standard with any specific design.

Ford requested that controls for automatic temperature control systems be exempted from the proposed requirements. Other manufacturers expressed concern about how to identify controls with multiple functions.

Volkswagen recommended that manufacturers be permitted to use words or symbols, of their own choosing, for heating and air conditioning controls. That company argued that such flexibility would result in more meaningful symbols being utilized for various functions. Volkswagen acknowledged that such flexibility could result in lack of uniform use of the same symbol for the same control by all manufacturers and in use of symbols not consistent with international recommendations. That commenter did not believe that these would be significant problems, however, noting among other things that there is so much variety in heating and air conditioning systems that each car would still be unique, even if the proposed symbols were used.

This notice adopts an approach along the lines suggested by Volkswagen. NHTSA continues to believe that, as currently required, each function of a heating or air conditioning system should be identified. Based on its review of comments,

however, the agency agrees that the proposed symbols are not adequate for defining the functions of all heating and air conditioning systems. While the agency considered simply maintaining the current requirement that words be used for functions where symbols are not specified, the agency has decided instead that both safety and cost reduction through harmonization are best served by permitting manufacturers to identify such functions by words or symbols, with the specific words or symbols at the discretion of the manufacturer.

As discussed above, the agency has previously concluded that symbols can convey information more quickly and with less chance of human error than words, resulting in safety benefits. Use of symbols appears to be particularly appropriate for identifying some functions of complex heating and air conditioning systems. For example, a relatively simple symbol can convey information about such things as the direction of air flow more readily and clearly than words.

The agency continues to believe that, for purposes of optimum recognizability, standardized international symbols should be used wherever possible. In the case of symbols for some functions of heating and air conditioning systems, however, where the agency has concluded that standardized symbols are not fully or adequately developed, the agency considers it appropriate to permit manufacturers to use symbols of their own choosing. This action may not only result in safety benefits, as manufacturers develop and use symbols for these functions, but also promotes harmonization. Manufacturers which produce vehicles for sale in non-English-speaking countries using symbols will not need to develop special designs using English words.

The agency will monitor the continued development of international symbols in this area, as well as the symbols actually used by manufacturers on their vehicles' heating and air conditioning systems. If circumstances should warrant, the agency may consider specifying standardized symbols in the future.

The agency declines to exempt automatic temperature control systems from the standard's identification requirements. The need for identification of controls for this type of system is no different than for traditional heating and air conditioning systems. However, the option of using words or symbols of the manufacturer's choosing should

provide ample flexibility in identifying the controls of these systems.

Manufacturers will continue to be required to use the symbols specified by Standard No. 101 for the fan, windshield defrosting and defogging, and rear window defrosting and defogging. The option of using words or symbols of the manufacturer's choosing applies only to other functions. The addition of this option does not impose any new requirements since manufacturers are already required to identify those other functions by words.

Interpretive Amendments

This notice adopts several interpretive amendments, as proposed by the November 1982 notice and in accord with previous agency interpretations. Two footnotes concerning the turn signal control symbol are added to Table 1. That symbol, a pair of horizontal arrows pointing to the left and right, is ordinarily a single symbol. One footnote makes it clear that the two arrows may be considered separate symbols where there are independent controls for the left and right turn signals. The other footnote makes it clear that framed areas of that symbol or symbols may be filled in.

Section S5.3.5 of Standard No. 105 is amended to indicate that the words "Brake Fluid" need not be used for a separate indicator lamp for brake fluid where a vehicle uses hydraulic system mineral oil rather than conventional brake fluid. (A manufacturer is instead required to use the word "Brake" and appropriate additional labeling.)

This notice also makes related interpretive amendments of a minor nature in section S5.3.5 of Standard No. 105 and Table 2 of Standard No. 101 that were not proposed by the November 1982 notice. Section S5.3.5 currently requires that a malfunction in an anti lock system be identified by the word "Antilock". Table 2 specifies the same word but in a hyphenated form, i.e., "Anti-Lock." This notice amends the two standards to make it clear that a manufacturer may use either form of the word. Since these amendments are interpretive, notice and comment is not required.

The November 1982 notice also proposed other changes in section S5.3.5 of Standard No. 105. While the agency is not adopting any other substantive changes in that section at this time, it is adopting a new format for that section along the lines proposed by that notice.

The November 1982 notice proposed to drop the words listed by column 2 of Table 1 for controls for

which a symbol is also specified. Section S5.2.1(a) provides that while the symbol specified by Table 1 for such a control is mandatory, the words listed by column 2 may be used in addition to the symbol. That same section provides further, however, that any additional words or symbols may be used at the manufacturer's discretion for purposes of clarity. Since manufacturers may use any words in addition to the required symbol, the provision that a manufacturer may use the words specified by column 2 has no legal effect. Accordingly, this notice drops those words from column 2 and makes a conforming amendment to section S5.2.1(a).

Leadtime

The amendments are effective immediately. However, some amendments are of an optional nature until September 1, 1987. The agency finds good cause for an immediate effective date for the optional identification requirements since the amendments relieve restrictions, while reducing compliance costs and promoting safety.

The November 1982 notice proposed an effective date of September 1, 1985, for mandatory use of the new symbols. Several commenters suggested that date was too early. In promulgating this final rule, the agency has determined that a date of September 1, 1987 provides adequate leadtime. The agency also finds it is in the public interest to establish such a relatively long leadtime for mandatory use of the new symbols, given the nature of the changes and since such a leadtime minimizes compliance costs.

In consideration of the foregoing, §571.101 and §571.105, Chapter V of Title 49, Code of Federal Regulations, are amended as follows:

§571.101 [Amended]

1. Section S5 is revised to read as follows:

S5. *Requirements.* (a) Except as provided in paragraph (b) of this section, each passenger car, multipurpose passenger vehicle, truck and bus manufactured with any control listed in S5.1 or in column 1 of Table 1, and each passenger car, multipurpose passenger vehicle and truck or bus less than 10,000 pounds GVWR with any display listed in S5.1 or in column 1 of Table 2, shall meet the requirements of this standard for the location, identification, and illumination of such control or display.

(b) For vehicles manufactured before September 1, 1987, a manufacturer may, at its option—

(1) Meet the requirements in this standard to use identifying words or abbreviation or identifying

Standard No. 101 currently specifies symbols for several functions of a heating and air conditioning system, including the fan, defrosting and defogging, and rear window defrosting and defogging. The November 1982 NPRM proposed to add several ISO symbols to cover additional functions, including heating, air conditioning, various types of vents, and heated seat.

The agency received numerous comments which were opposed to adding these symbols to Standard No. 101. Some commenters stated that the symbols in question were inexplicit and had been adopted hastily by the ISO, without testing for recognizability. According to some commenters, there are efforts within the ISO to change the symbols. Concern was also expressed that the symbols are difficult to apply to many of the complex heating and air conditioning systems in use today or planned for the future. Several manufacturers submitted drawings of heating and air conditioning systems to illustrate the problems associated with the application of the proposed symbols. GM stated that questions of interpretation raise the concern that these particular proposed changes are not objective, since manufacturers would not have the requisite assurance that they have met the standard with any specific design.

Ford requested that controls for automatic temperature control systems be exempted from the proposed requirements. Other manufacturers expressed concern about how to identify controls with multiple functions.

Volkswagen recommended that manufacturers be permitted to use words or symbols, of their own choosing, for heating and air conditioning controls. That company argued that such flexibility would result in more meaningful symbols being utilized for various functions. Volkswagen acknowledged that such flexibility could result in lack of uniform use of the same symbol for the same control by all manufacturers and in use of symbols not consistent with international recommendations. That commenter did not believe that these would be significant problems, however, noting among other things that there is so much variety in heating and air conditioning systems that each car would still be unique, even if the proposed symbols were used.

This notice adopts an approach along the lines suggested by Volkswagen. NHTSA continues to believe that, as currently required, each function of a heating or air conditioning system should be identified. Based on its review of comments,

however, the agency agrees that the proposed symbols are not adequate for defining the functions of all heating and air conditioning systems. While the agency considered simply maintaining the current requirement that words be used for functions where symbols are not specified, the agency has decided instead that both safety and cost reduction through harmonization are best served by permitting manufacturers to identify such functions by words or symbols, with the specific words or symbols at the discretion of the manufacturer.

As discussed above, the agency has previously concluded that symbols can convey information more quickly and with less chance of human error than words, resulting in safety benefits. Use of symbols appears to be particularly appropriate for identifying some functions of complex heating and air conditioning systems. For example, a relatively simple symbol can convey information about such things as the direction of air flow more readily and clearly than words.

The agency continues to believe that, for purposes of optimum recognizability, standardized international symbols should be used wherever possible. In the case of symbols for some functions of heating and air conditioning systems, however, where the agency has concluded that standardized symbols are not fully or adequately developed, the agency considers it appropriate to permit manufacturers to use symbols of their own choosing. This action may not only result in safety benefits, as manufacturers develop and use symbols for these functions, but also promotes harmonization. Manufacturers which produce vehicles for sale in non-English-speaking countries using symbols will not need to develop special designs using English words.

The agency will monitor the continued development of international symbols in this area, as well as the symbols actually used by manufacturers on their vehicles' heating and air conditioning systems. If circumstances should warrant, the agency may consider specifying standardized symbols in the future.

The agency declines to exempt automatic temperature control systems from the standard's identification requirements. The need for identification of controls for this type of system is no different than for traditional heating and air conditioning systems. However, the option of using words or symbols of the manufacturer's choosing should

provide ample flexibility in identifying the controls of these systems.

Manufacturers will continue to be required to use the symbols specified by Standard No. 101 for the fan, windshield defrosting and defogging, and rear window defrosting and defogging. The option of using words or symbols of the manufacturer's choosing applies only to other functions. The addition of this option does not impose any new requirements since manufacturers are already required to identify those other functions by words.

Interpretive Amendments

This notice adopts several interpretive amendments, as proposed by the November 1982 notice and in accord with previous agency interpretations. Two footnotes concerning the turn signal control symbol are added to Table 1. That symbol, a pair of horizontal arrows pointing to the left and right, is ordinarily a single symbol. One footnote makes it clear that the two arrows may be considered separate symbols where there are independent controls for the left and right turn signals. The other footnote makes it clear that framed areas of that symbol or symbols may be filled in.

Section S5.3.5 of Standard No. 105 is amended to indicate that the words "Brake Fluid" need not be used for a separate indicator lamp for brake fluid where a vehicle uses hydraulic system mineral oil rather than conventional brake fluid. (A manufacturer is instead required to use the word "Brake" and appropriate additional labeling.)

This notice also makes related interpretive amendments of a minor nature in section S5.3.5 of Standard No. 105 and Table 2 of Standard No. 101 that were not proposed by the November 1982 notice. Section S5.3.5 currently requires that a malfunction in an anti lock system be identified by the word "Antilock". Table 2 specifies the same word but in a hyphenated form, i.e., "Anti-Lock." This notice amends the two standards to make it clear that a manufacturer may use either form of the word. Since these amendments are interpretive, notice and comment is not required.

The November 1982 notice also proposed other changes in section S5.3.5 of Standard No. 105. While the agency is not adopting any other substantive changes in that section at this time, it is adopting a new format for that section along the lines proposed by that notice.

The November 1982 notice proposed to drop the words listed by column 2 of Table 1 for controls for

which a symbol is also specified. Section S5.2.1(a) provides that while the symbol specified by Table 1 for such a control is mandatory, the words listed by column 2 may be used in addition to the symbol. That same section provides further, however, that any additional words or symbols may be used at the manufacturer's discretion for purposes of clarity. Since manufacturers may use any words in addition to the required symbol, the provision that a manufacturer may use the words specified by column 2 has no legal effect. Accordingly, this notice drops those words from column 2 and makes a conforming amendment to section S5.2.1(a).

Leadtime

The amendments are effective immediately. However, some amendments are of an optional nature until September 1, 1987. The agency finds good cause for an immediate effective date for the optional identification requirements since the amendments relieve restrictions, while reducing compliance costs and promoting safety.

The November 1982 notice proposed an effective date of September 1, 1985, for mandatory use of the new symbols. Several commenters suggested that date was too early. In promulgating this final rule, the agency has determined that a date of September 1, 1987 provides adequate leadtime. The agency also finds it is in the public interest to establish such a relatively long leadtime for mandatory use of the new symbols, given the nature of the changes and since such a leadtime minimizes compliance costs.

In consideration of the foregoing, §571.101 and §571.105, Chapter V of Title 49, Code of Federal Regulations, are amended as follows:

§571.101 [Amended]

1. Section S5 is revised to read as follows:

S5. *Requirements.* (a) Except as provided in paragraph (b) of this section, each passenger car, multipurpose passenger vehicle, truck and bus manufactured with any control listed in S5.1 or in column 1 of Table 1, and each passenger car, multipurpose passenger vehicle and truck or bus less than 10,000 pounds GVWR with any display listed in S5.1 or in column 1 of Table 2, shall meet the requirements of this standard for the location, identification, and illumination of such control or display.

(b) For vehicles manufactured before September 1, 1987, a manufacturer may, at its option—

(1) Meet the requirements in this standard to use identifying words or abbreviation or identifying

symbol for a control by using those specified in Table 1(a) instead of Table 1. If none are specified in Table 1(a), none need be used for the control.

(2) Meet the requirements in this standard to use identifying words or abbreviation or identifying symbol for a display by using those specified in Table 2(a) instead of Table 2. If none are specified in Table 2(a), none need be used for the display.

2. Section S5.2.1(a) is revised to read as follows:

(a) Except as specified in S5.2.1(b), any hand-operated control listed in column 1 of Table 1 that has a symbol designated in column 3 shall be identified by that symbol. Any such control for which no symbol is shown in Table 1 shall be identified by the word or abbreviation shown in column 2, if such word or abbreviation is shown. Words or symbols in addition to the required symbol, word or abbreviation may be used at the manufacturer's discretion for the purpose of clarity. Any such control for which column 2 of Table 1 and/or column 3 of Table 1 specifies "Mfr. Option" shall be identified by the manufacturer's choice of a symbol, word or abbreviation, as indicated by that specification in column 2 and/or column 3. The identification shall be placed on or adjacent to the control. The identification shall, under the conditions of S6, be visible to the driver and, except as provided in S5.2.1.1 and S5.2.1.2, appear to the driver perceptually upright.

3. Section S5.2.1.1 is revised to read as follows:

S5.2.1.1 The identification of a master lighting switch or headlamp and tail lamp control that adjusts control and display illumination by means of rotation, or of any other rotating control that does not have an off position, need not appear to the driver perceptually upright. The identification of a horn control need not appear to the driver perceptually upright except when the vehicle, aligned to the manufacturer's specifications, has its wheels positioned for the vehicle to travel in a straight forward direction.

4. The second sentence of section S5.2.2 is revised to read as follows:

If this identification is not specified in Tables 1 or 2, it shall be in word or symbol form unless color coding is used.

5. A new Table 1 is added following section S6 to read as set forth below.

6. The existing Table 1 is redesignated Table 1(a).

7. A new Table 2 is added following Table 1(a) to read as set forth below.

8. The existing Table 2 is redesignated Table 2(a).

§571.105 [Amended]

1. Section S5.3.5 is revised to read as follows:

S5.3.5(a) Each indicator lamp shall display word or words, in accordance with the requirements of Standard No. 101 (49 CFR 571.101) and/or this section, which shall be legible to the driver in daylight when lighted. The words shall have letters not less than 1/8-inch high. Words in addition to those required by Standard No. 101 and/or this section and symbols may be provided for purposes of clarity.

(b) If a single common indicator is used, the lamp shall display the word "Brake". The letters and background of a single common indicator shall be of contrasting colors, one of which is red.

(c)(1) If separate indicator lamps are used for one or more than one of the functions described in S5.3.1(a) through S5.3.1(d), the display shall, except as provided in (c)(1)(A) through (D) of this section, include the word "Brake" and appropriate additional labeling.

(A) If a separate indicator lamp is provided for gross loss of pressure, the words "Brake Pressure" shall be used for S5.3.1(a).

(B) If a separate indicator lamp is provided for low brake fluid, the words "Brake Fluid" shall be used for S5.3.1(b), except for vehicles using hydraulic system mineral oil.

(C) If a separate indicator lamp is provided for an anti lock system, the single word "Antilock" or "Anti-Lock" may be used for S5.3.1(c).

(D) If a separate indicator lamp is provided for application of the parking brake, the single word "Park" may be used for S5.3.1(d).








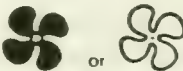


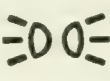
(2) Except for a separate indicator lamp for an anti lock system, the letters and background of each separate indicator lamp shall be of contrasting colors, one of which is red. The letters and background of a separate indicator lamp for an anti lock system shall be of contrasting colors, one of which is yellow.

Issued on July 24, 1984

Diane K. Steed
Administrator

49 FR 30191
July 27, 1984

Table 1
Identification and Illumination of Controls

| Column 1 | Column 2 | Column 3 | Column 4 |
|--|-----------------------------------|--|--------------|
| Hand Operated Controls | Identifying Words or Abbreviation | Identifying Symbol | Illumination |
| Master Lighting Switch | — |  ⁵ | — |
| Headlamps and Tail lamps | (Mfr. Option) ² | (Mfr. Option) ² | — |
| Horn | — |  ⁴ | — |
| Turn Signal | — |  ³ ⁵ | — |
| Hazard Warning Signal | — |  ⁵ | Yes |
| Windshield Wiping System | — |  ⁵ | Yes |
| Windshield Washing System | — |  ⁵ | Yes |
| Windshield Washing and Wiping Combined | — |  ⁵ | Yes |
| Heating and or Air Conditioning Fan | — |  or ⁵ | Yes |
| Windshield Defrosting and Defogging System | — |  ⁵ | Yes |
| Rear Window Defrosting and Defogging System | — |  ⁵ | Yes |
| Identification, Side Marker and or Clearance Lamps | — |  ² ⁵ | Yes |
| Manual Choke | Choke | — | — |
| Engine Start | Engine Start ¹ | — | — |
| Engine Stop | Engine Stop ¹ | — | Yes |
| Hand Throttle | Throttle | — | — |
| Automatic Vehicle Speed | (Mfr. Option) | — | Yes |
| Heating and Air Conditioning System | (Mfr. Option) | (Mfr. Option) | Yes |

¹ Use when engine control is separate from the key locking system.

² Separate identification not required if controlled by master lighting switch.

³ The pair of arrows is a single symbol. When the controls for left and right turn operate independently, however, the two arrows may be considered separate symbols and be spaced accordingly.

⁴ Identification not required for vehicles with a GVWR greater than 10,000 lbs., or for narrow ring-type controls.

⁵ Framed areas may be filled.

symbol for a control by using those specified in Table 1(a) instead of Table 1. If none are specified in Table 1(a), none need be used for the control.

(2) Meet the requirements in this standard to use identifying words or abbreviation or identifying symbol for a display by using those specified in Table 2(a) instead of Table 2. If none are specified in Table 2(a), none need be used for the display.

2. Section S5.2.1(a) is revised to read as follows:

(a) Except as specified in S5.2.1(b), any hand-operated control listed in column 1 of Table 1 that has a symbol designated in column 3 shall be identified by that symbol. Any such control for which no symbol is shown in Table 1 shall be identified by the word or abbreviation shown in column 2, if such word or abbreviation is shown. Words or symbols in addition to the required symbol, word or abbreviation may be used at the manufacturer's discretion for the purpose of clarity. Any such control for which column 2 of Table 1 and/or column 3 of Table 1 specifies "Mfr. Option" shall be identified by the manufacturer's choice of a symbol, word or abbreviation, as indicated by that specification in column 2 and/or column 3. The identification shall be placed on or adjacent to the control. The identification shall, under the conditions of S6, be visible to the driver and, except as provided in S5.2.1.1 and S5.2.1.2, appear to the driver perceptually upright.

3. Section S5.2.1.1 is revised to read as follows:

S5.2.1.1 The identification of a master lighting switch or headlamp and tail lamp control that adjusts control and display illumination by means of rotation, or of any other rotating control that does not have an off position, need not appear to the driver perceptually upright. The identification of a horn control need not appear to the driver perceptually upright except when the vehicle, aligned to the manufacturer's specifications, has its wheels positioned for the vehicle to travel in a straight forward direction.

4. The second sentence of section S5.2.2 is revised to read as follows:

If this identification is not specified in Tables 1 or 2, it shall be in word or symbol form unless color coding is used.

5. A new Table 1 is added following section S6 to read as set forth below.

6. The existing Table 1 is redesignated Table 1(a).

7. A new Table 2 is added following Table 1(a) to read as set forth below.

8. The existing Table 2 is redesignated Table 2(a).

§571.105 [Amended]

1. Section S5.3.5 is revised to read as follows:

S5.3.5(a) Each indicator lamp shall display word or words, in accordance with the requirements of Standard No. 101 (49 CFR 571.101) and/or this section, which shall be legible to the driver in daylight when lighted. The words shall have letters not less than 1/8-inch high. Words in addition to those required by Standard No. 101 and/or this section and symbols may be provided for purposes of clarity.

(b) If a single common indicator is used, the lamp shall display the word "Brake". The letters and background of a single common indicator shall be of contrasting colors, one of which is red.

(c)(1) If separate indicator lamps are used for one or more than one of the functions described in S5.3.1(a) through S5.3.1(d), the display shall, except as provided in (c)(1)(A) through (D) of this section, include the word "Brake" and appropriate additional labeling.

(A) If a separate indicator lamp is provided for gross loss of pressure, the words "Brake Pressure" shall be used for S5.3.1(a).

(B) If a separate indicator lamp is provided for low brake fluid, the words "Brake Fluid" shall be used for S5.3.1(b), except for vehicles using hydraulic system mineral oil.

(C) If a separate indicator lamp is provided for an anti lock system, the single word "Antilock" or "Anti-Lock" may be used for S5.3.1(c).

(D) If a separate indicator lamp is provided for application of the parking brake, the single word "Park" may be used for S5.3.1(d).












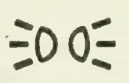
(2) Except for a separate indicator lamp for an anti lock system, the letters and background of each separate indicator lamp shall be of contrasting colors, one of which is red. The letters and background of a separate indicator lamp for an anti lock system shall be of contrasting colors, one of which is yellow.

Issued on July 24, 1984

Diane K. Steed
Administrator

49 FR 30191
July 27, 1984

Table 1
Identification and Illumination of Controls

| Column 1 | Column 2 | Column 3 | Column 4 |
|--|-----------------------------------|---|--------------|
| Hand Operated Controls | Identifying Words or Abbreviation | Identifying Symbol | Illumination |
| Master Lighting Switch | — |  ⁵ | — |
| Headlamps and Tail lamps | (Mfr. Option) ² | (Mfr. Option) ² | — |
| Horn | — |  ⁴ | — |
| Turn Signal | — |  ³ ₅ | — |
| Hazard Warning Signal | — |  ⁵ | Yes |
| Windshield Wiping System | — |  | Yes |
| Windshield Washing System | — |  | Yes |
| Windshield Washing and Wiping Combined | — |  | Yes |
| Heating and or Air Conditioning Fan | — |  or  | Yes |
| Windshield Defrosting and Defogging System | — |  | Yes |
| Rear Window Defrosting and Defogging System | — |  | Yes |
| Identification, Side Marker and or Clearance Lamps | — |  ² ₅ | Yes |
| Manual Choke | Choke | — | — |
| Engine Start | Engine Start ¹ | — | — |
| Engine Stop | Engine Stop ¹ | — | Yes |
| Hand Throttle | Throttle | — | — |
| Automatic Vehicle Speed | (Mfr. Option) | — | Yes |
| Heating and Air Conditioning System | (Mfr. Option) | (Mfr. Option) | Yes |

¹ Use when engine control is separate from the key locking system.

² Separate identification not required if controlled by master lighting switch.

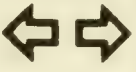

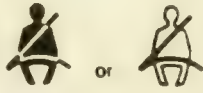
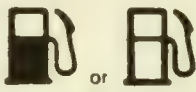




³ The pair of arrows is a single symbol. When the controls for left and right turn operate independently, however, the two arrows may be considered separate symbols and be spaced accordingly.

⁴ Identification not required for vehicles with a GVWR greater than 10,000 lbs., or for narrow ring-type controls.

⁵ Framed areas may be filled.

Table 2

Identification and Illumination of Displays

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 |
|--------------------------------------|----------------------------|---|---|--------------|
| Display | Telltale Color | Identifying Words or Abbreviation | Identifying Symbol | Illumination |
| Turn Signal Telltale | Green | Also see FMVSS 108 |  ¹ ₆ | — |
| Hazard Warning Telltale | Red ⁴ | Also see FMVSS 108 |  ² ₆ | — |
| Seat Belt Telltale | Red ⁴ | Also see FMVSS 208 |  or | — |
| Fuel Level Telltale | Yellow | Fuel |  or | — |
| Gauge | — | | | Yes |
| Oil Pressure Telltale | Red ⁴ | Oil |  | — |
| Gauge | — | | | Yes |
| Coolant Temperature Telltale | Red ⁴ | Temp |  | — |
| Gauge | — | | | Yes |
| Electrical Charge Telltale | Red ⁴ | Volts, Charge or Amp |  | — |
| Gauge | — | | | Yes |
| Highbeam Telltale | Blue or Green ⁴ | Also see FMVSS 108 |  ⁶ | — |
| Malfunction in Anti-Lock or | Yellow | Antilock or Anti-lock Also see FMVSS 105 | — | — |
| Brake System | Red ⁴ | Brake. Also see FMVSS 105 | — | — |
| Brake Air Pressure Position Telltale | Red ⁴ | Brake Air. Also see FMVSS 121 | — | — |
| Speedometer | — | MPH ⁵ | — | Yes |
| Odometer | — | — ³ | — | — |
| Automatic Gear Position | — | Also see FMVSS 102 | — | Yes |

¹ The pair of arrows is a single symbol. When the indicator for left and right turn operate independently, however, the two arrows will be considered separate symbols and may be spaced accordingly.

² Not required when arrows of turn signal tell-tales that otherwise operate independently flash simultaneously as hazard warning tell-tale.

³ If the odometer indicates kilometers, then "KILOMETERS" or "km" shall appear, otherwise, no identification is required.

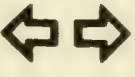


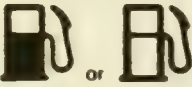




⁴ Red can be red-orange. Blue can be blue-green.

⁵ If the speedometer is graduated in miles per hour and in kilometers per hour, the identifying words or abbreviations shall be "MPH and km/h" in any combination of upper or lower case letters.

⁶ Framed areas may be filled.

Table 2

Identification and Illumination of Displays

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 |
|--|----------------------------|---|---|--------------|
| Display | Telltale Color | Identifying Words or Abbreviation | Identifying Symbol | Illumination |
| Turn Signal Telltale | Green | Also see FMVSS 108 |  ¹ ₆ | — |
| Hazard Warning Telltale | Red ⁴ | Also see FMVSS 108 |  ² ₆ | — |
| Seat Belt Telltale | Red ⁴ | Also see FMVSS 208 |  | — |
| <u>Fuel Level</u> Telltale | Yellow | Fuel |  | — |
| Gauge | — | | | Yes |
| <u>Oil Pressure</u> Telltale | Red ⁴ | Oil |  | — |
| Gauge | — | | | Yes |
| <u>Coolant Temperature</u> Telltale | Red ⁴ | Temp |  | — |
| Gauge | — | | | Yes |
| <u>Electrical Charge</u> Telltale | Red ⁴ | Volts, Charge or Amp |  | — |
| Gauge | — | | | Yes |
| Highbeam Telltale | Blue or Green ⁴ | Also see FMVSS 108 |  ⁶ | — |
| <u>Malfunction in</u> <u>Anti-Lock or</u> | Yellow | Antilock or Anti-lock Also see FMVSS 105 | — | — |
| Brake System | Red ⁴ | Brake. Also see FMVSS 105 | — | — |
| Brake Air Pressure Position Telltale | Red ⁴ | Brake Air. Also see FMVSS 121 | — | — |
| Speedometer | — | MPH ⁵ | — | Yes |
| Odometer | — | — ³ | — | — |
| Automatic Gear Position | — | Also see FMVSS 102 | — | Yes |

¹ The pair of arrows is a single symbol. When the indicator for left and right turn operate independently, however, the two arrows will be considered separate symbols and may be spaced accordingly.

² Not required when arrows of turn signal tell-tales that otherwise operate independently flash simultaneously as hazard warning tell-tale.

³ If the odometer indicates kilometers, then "KILOMETERS" or "km" shall appear, otherwise, no identification is required.

⁴ Red can be red-orange. Blue can be blue-green.

⁵ If the speedometer is graduated in miles per hour and in kilometers per hour, the identifying words or abbreviations shall be "MPH and km/h" in any combination of upper or lower case letters.

⁶ Framed areas may be filled.

FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 101

Controls and Displays

(Docket No. 1-18; Notice 13)

S1. Scope. This standard specifies requirements for the location, identification, and illumination of motor vehicle controls and displays.

S2. Purpose. The purpose of this standard is to ensure the accessibility and visibility of motor vehicle controls and displays and to facilitate their selection under daylight and nighttime conditions, in order to reduce the safety hazards caused by the diversion of the driver's attention from the driving task, and by mistakes in selecting controls.

S3. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S4. Definitions.

"Telltale" means a display that indicates, by means of a light-emitting signal, the actuation of a device, a correct or defective functioning or condition, or a failure to function.

"Gauge" means a display that is listed in S5.1 or in Table 2 and is not a telltale.

"Informational readout display" means a display using light-emitting diodes, liquid crystals, or other electro illuminating devices where one or more than one type of information or message may be displayed.

S5. Requirements. [(a) Except as provided in paragraph (b) of this section, each passenger car, multipurpose passenger vehicle, truck, and bus manufactured with any control listed in S5.1 or in column 1 of Table 1, and each passenger car, multipurpose passenger vehicle and truck or bus less than 10,000 pounds GVWR with any display listed in S5.1 or in column 1 of Table 2, shall meet the requirements of this standard for the location, identification, and illumination of such control or display.

(b) For vehicles manufactured before September 1, 1987, a manufacturer may, at its option—

(1) Meet the requirements in this standard to use identifying words or abbreviation or identifying symbol for a control by using those specified in Table 1(a) instead of Table 1. If none are specified in Table 1(a), none need be used for the control.

(2) Meet the requirements in this standard to use identifying words or abbreviation or identifying symbol for a display by using those specified in Table 2(a) instead of Table 2. If none are specified in Table 2(a), none need be used for the display. (49 F.R. 30191—July 27, 1984. Effective: July 27, 1984)]

S5.1 Location. Under the conditions of S6, each of the following controls that is furnished shall be operable by the driver and each of the following displays that is furnished shall be visible to the driver. Under conditions of S6, telltales and informational readout displays are considered visible when activated.

HAND-OPERATED CONTROLS

- (a) Steering wheel.
- (b) Horn.
- (c) Ignition.
- (d) Headlamp.
- (e) Tail lamp.
- (f) Turn signal.
- (g) Illumination intensity.
- (h) Windshield wiper.
- (i) Windshield washer.
- (j) Manual transmission shift lever, except transfer case.
- (k) Windshield defrosting, and defogging system.
- (l) Rear window defrosting and defogging system.
- (m) Manual choke.
- (n) Driver's sun visor.

- (o) Automatic vehicle speed system.
- (p) Highbeam.
- (q) Hazard warning signal.
- (r) Clearance lamps.
- (s) Hand throttle.
- (t) Identification lamps.

FOOT-OPERATED CONTROLS

- (a) Service brake.
- (b) Accelerator.
- (c) Clutch.
- (d) Highbeam.
- (e) Windshield washer.
- (f) Windshield wiper.

DISPLAYS

- (a) Speedometer.
- (b) Turn signal.
- (c) Gear position.
- (d) Brake failure warning.
- (e) Fuel.
- (f) Engine coolant temperature.
- (g) Oil.
- (h) Highbeam.
- (i) Electrical Charge.

S5.2 Identification.

S5.2.1 Vehicle controls shall be identified as follows:

[(a) Except as specified in S5.2.1(b), any hand-operated control listed in column 1 of Table 1 that has a symbol designated in column 3 shall be identified by that symbol. Any such control for which no symbol is shown in Table 1 shall be identified by the word or abbreviation shown in column 2, if such word or abbreviation is shown. Words or symbols in addition to the required symbol, word or abbreviation may be used at the manufacturer's discretion for the purpose of clarity. Any such control for which column 2 of Table 1 and/or column 3 of Table 1 specifies "Mfr. Option" shall be identified by the manufacturer's choice of a symbol, word or abbreviation, as indicated by that specification in column 2 and/or column 3. The identification shall be placed on or adjacent to the control. The identification shall, under the conditions of S6, be visible to the driver and, except as provided in S5.2.1.1 and S5.2.1.2, appear to the driver perceptually upright. (49 F.R. 30191—July 27, 1984. Effective: July 27, 1984)]

(b) S5.2.1(a) does not apply to a turn signal control which is operated in a plane essentially parallel to the face plane of the steering wheel in its normal driving position and which is located on the left

side of the steering column so that it is the control on that side of the column nearest to the steering wheel face plane.

S5.2.1.1 [The identification of a master lighting switch or headlamp and tail lamp control that adjusts control and display illumination by means of rotation, or of any other rotating control that does not have an off position, need not appear to the driver perceptually upright. The identification of a horn control need not appear to the driver perceptually upright except when the vehicle, aligned to the manufacturer's specifications, has its wheels positioned for the vehicle to travel in a straight forward direction. (49 F.R. 30191—July 27, 1984. Effective: July 27, 1984)]

S5.2.1.2 The identification of a rotating control other than one described by S5.2.1.1 shall appear to the driver perceptually upright when the control is in the off position.

S5.2.2 Identification shall be provided for each function of any automatic vehicle speed system control and any heating and air conditioning system control, and for the extreme positions of any such control that regulates a function over a quantitative range. If this identification is not specified in Tables 1 or 2, it shall be in word [or symbol] form unless color coding is used. If color coding is used to identify the extreme positions of a temperature control, the hot extreme shall be identified by the color red and the cold extreme by the color blue.

Example 1 A slide lever controls the temperature of the air in the vehicle heating system over a continuous range, from no heat to maximum heat. Since the control regulates a single function over a quantitative range, only the extreme positions require identification.

Example 2 A switch has three positions, for heat, defrost, and air conditioning. Since each position regulates a different function, each position must be identified.

S5.2.3 Except for informational readout displays, any display located within the passenger compartment and listed in column 1 of Table 2 that has a symbol designated in column 4, shall be identified by that symbol. Such display may, in addition be identified by the word or abbreviation shown in column 3. Any such display for which no symbol is provided in Table 2 shall be identified by the word or abbreviation shown in column 3. Informational readout displays may be identified by the symbol

FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 101

Controls and Displays

(Docket No. 1-18; Notice 13)

S1. Scope. This standard specifies requirements for the location, identification, and illumination of motor vehicle controls and displays.

S2. Purpose. The purpose of this standard is to ensure the accessibility and visibility of motor vehicle controls and displays and to facilitate their selection under daylight and nighttime conditions, in order to reduce the safety hazards caused by the diversion of the driver's attention from the driving task, and by mistakes in selecting controls.

S3. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S4. Definitions.

"Telltale" means a display that indicates, by means of a light-emitting signal, the actuation of a device, a correct or defective functioning or condition, or a failure to function.

"Gauge" means a display that is listed in S5.1 or in Table 2 and is not a telltale.

"Informational readout display" means a display using light-emitting diodes, liquid crystals, or other electro illuminating devices where one or more than one type of information or message may be displayed.

S5. Requirements. [(a) Except as provided in paragraph (b) of this section, each passenger car, multipurpose passenger vehicle, truck, and bus manufactured with any control listed in S5.1 or in column 1 of Table 1, and each passenger car, multipurpose passenger vehicle and truck or bus less than 10,000 pounds GVWR with any display listed in S5.1 or in column 1 of Table 2, shall meet the requirements of this standard for the location, identification, and illumination of such control or display.

(b) For vehicles manufactured before September 1, 1987, a manufacturer may, at its option—

(1) Meet the requirements in this standard to use identifying words or abbreviation or identifying symbol for a control by using those specified in Table 1(a) instead of Table 1. If none are specified in Table 1(a), none need be used for the control.

(2) Meet the requirements in this standard to use identifying words or abbreviation or identifying symbol for a display by using those specified in Table 2(a) instead of Table 2. If none are specified in Table 2(a), none need be used for the display. (49 F.R. 30191—July 27, 1984. Effective: July 27, 1984)]

S5.1 Location. Under the conditions of S6, each of the following controls that is furnished shall be operable by the driver and each of the following displays that is furnished shall be visible to the driver. Under conditions of S6, telltales and informational readout displays are considered visible when activated.

HAND-OPERATED CONTROLS

- (a) Steering wheel.
- (b) Horn.
- (c) Ignition.
- (d) Headlamp.
- (e) Tail lamp.
- (f) Turn signal.
- (g) Illumination intensity.
- (h) Windshield wiper.
- (i) Windshield washer.
- (j) Manual transmission shift lever, except transfer case.
- (k) Windshield defrosting, and defogging system.
- (l) Rear window defrosting and defogging system.
- (m) Manual choke.
- (n) Driver's sun visor.

- (o) Automatic vehicle speed system.
- (p) Highbeam.
- (q) Hazard warning signal.
- (r) Clearance lamps.
- (s) Hand throttle.
- (t) Identification lamps.

FOOT-OPERATED CONTROLS

- (a) Service brake.
- (b) Accelerator.
- (c) Clutch.
- (d) Highbeam.
- (e) Windshield washer.
- (f) Windshield wiper.

DISPLAYS

- (a) Speedometer.
- (b) Turn signal.
- (c) Gear position.
- (d) Brake failure warning.
- (e) Fuel.
- (f) Engine coolant temperature.
- (g) Oil.
- (h) Highbeam.
- (i) Electrical Charge.

S5.2 Identification.

S5.2.1 Vehicle controls shall be identified as follows:

[(a) Except as specified in S5.2.1(b), any hand-operated control listed in column 1 of Table 1 that has a symbol designated in column 3 shall be identified by that symbol. Any such control for which no symbol is shown in Table 1 shall be identified by the word or abbreviation shown in column 2, if such word or abbreviation is shown. Words or symbols in addition to the required symbol, word or abbreviation may be used at the manufacturer's discretion for the purpose of clarity. Any such control for which column 2 of Table 1 and/or column 3 of Table 1 specifies "Mfr. Option" shall be identified by the manufacturer's choice of a symbol, word or abbreviation, as indicated by that specification in column 2 and/or column 3. The identification shall be placed on or adjacent to the control. The identification shall, under the conditions of S6, be visible to the driver and, except as provided in S5.2.1.1 and S5.2.1.2, appear to the driver perceptually upright. (49 F.R. 30191—July 27, 1984. Effective: July 27, 1984)]

(b) S5.2.1(a) does not apply to a turn signal control which is operated in a plane essentially parallel to the face plane of the steering wheel in its normal driving position and which is located on the left

side of the steering column so that it is the control on that side of the column nearest to the steering wheel face plane.

S5.2.1.1 [The identification of a master lighting switch or headlamp and tail lamp control that adjusts control and display illumination by means of rotation, or of any other rotating control that does not have an off position, need not appear to the driver perceptually upright. The identification of a horn control need not appear to the driver perceptually upright except when the vehicle, aligned to the manufacturer's specifications, has its wheels positioned for the vehicle to travel in a straight forward direction. (49 F.R. 30191—July 27, 1984. Effective: July 27, 1984)]

S5.2.1.2 The identification of a rotating control other than one described by S5.2.1.1 shall appear to the driver perceptually upright when the control is in the off position.

S5.2.2 Identification shall be provided for each function of any automatic vehicle speed system control and any heating and air conditioning system control, and for the extreme positions of any such control that regulates a function over a quantitative range. If this identification is not specified in Tables 1 or 2, it shall be in word [or symbol] form unless color coding is used. If color coding is used to identify the extreme positions of a temperature control, the hot extreme shall be identified by the color red and the cold extreme by the color blue.

Example 1 A slide lever controls the temperature of the air in the vehicle heating system over a continuous range, from no heat to maximum heat. Since the control regulates a single function over a quantitative range, only the extreme positions require identification.

Example 2 A switch has three positions, for heat, defrost, and air conditioning. Since each position regulates a different function, each position must be identified.

S5.2.3 Except for informational readout displays, any display located within the passenger compartment and listed in column 1 of Table 2 that has a symbol designated in column 4, shall be identified by that symbol. Such display may, in addition be identified by the word or abbreviation shown in column 3. Any such display for which no symbol is provided in Table 2 shall be identified by the word or abbreviation shown in column 3. Informational readout displays may be identified by the symbol

designated in column 4 of Table 2 or by the word or abbreviation shown in column 3. Additional words or symbols may be used at the manufacturer's discretion for the purpose of clarity. The identification required or permitted by this section shall be placed on or adjacent to the display that it identifies. The identification of any display shall, under the conditions of S6, be visible to the driver and appear to the driver perceptually upright.

S5.3 Illumination.

S5.3.1 Except for foot-operated controls or hand-operated controls mounted upon the floor, floor console, or steering column, or in the windshield header area, the identification required by § 5.2.1 or § 5.2.2 of any control listed in column 1 of Table 1 and accompanied by the word "yes" in the corresponding space in column 4 shall be capable of being illuminated whenever the headlights are activated. However, control identification for a heating and air-conditioning system need not be illuminated if the system does not direct air directly upon windshield. If a gauge is listed in column 1 of Table 2 and accompanied by the word "yes" in column 5, then the gauge and its identification required by § 5.2.3 shall be illuminated whenever the ignition switch and/or the headlamps are activated. Controls, gauges, and their identifications need not be illuminated when the headlamps are being flashed. A telltale shall not emit light except when identifying the malfunction or vehicle condition for whose indication it is designed or during a bulb check upon vehicle starting.

S5.3.2 Except for informational readout displays, each discrete and distinct telltale shall be of the color shown in column 2 of Table 2. The iden-

tification of each telltale shall be in a color that contrasts with the lens, if a telltale with a lens is used. Any telltale used in conjunction with a gauge need not be identified. The color of informational readout displays will be at the option of the manufacturer.

S5.3.3 Light intensities for controls, gauges, and their identification shall be continuously variable from: (a) a position at which either there is no light emitted or the light is barely discernible to a driver who has adapted to dark ambient roadway conditions to (b) a position providing illumination sufficient for the driver to identify the control or display readily under conditions of reduced visibility. Light intensities for informational readout systems shall have at least two values, a higher one for day, and a lower one for nighttime that is provided in the passenger compartment when and only when the headlights are activated shall also be variable in a manner that complies with this paragraph. The light intensity of each telltale shall not be variable and shall be such that, when activated, that telltale and its identification are visible to the driver under all daytime and nighttime conditions.

S6. Conditions. The driver is restrained by the crash protection equipment installed in accordance with the requirements of § 571.208 of this part (Standard No. 208), adjusted in accordance with the manufacturer's instructions.

Joan Claybrook
Administrator

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designated in column 4 of Table 2 or by the word or abbreviation shown in column 3. Additional words or symbols may be used at the manufacturer's discretion for the purpose of clarity. The identification required or permitted by this section shall be placed on or adjacent to the display that it identifies. The identification of any display shall, under the conditions of S6, be visible to the driver and appear to the driver perceptually upright.

S5.3 Illumination.

S5.3.1 Except for foot-operated controls or hand-operated controls mounted upon the floor, floor console, or steering column, or in the windshield header area, the identification required by § 5.2.1 or § 5.2.2 of any control listed in column 1 of Table 1 and accompanied by the word "yes" in the corresponding space in column 4 shall be capable of being illuminated whenever the headlights are activated. However, control identification for a heating and air-conditioning system need not be illuminated if the system does not direct air directly upon windshield. If a gauge is listed in column 1 of Table 2 and accompanied by the word "yes" in column 5, then the gauge and its identification required by § 5.2.3 shall be illuminated whenever the ignition switch and/or the headlamps are activated. Controls, gauges, and their identifications need not be illuminated when the headlamps are being flashed. A telltale shall not emit light except when identifying the malfunction or vehicle condition for whose indication it is designed or during a bulb check upon vehicle starting.

S5.3.2 Except for informational readout displays, each discrete and distinct telltale shall be of the color shown in column 2 of Table 2. The iden-

tification of each telltale shall be in a color that contrasts with the lens, if a telltale with a lens is used. Any telltale used in conjunction with a gauge need not be identified. The color of informational readout displays will be at the option of the manufacturer.











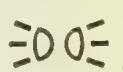
S5.3.3 Light intensities for controls, gauges, and their identification shall be continuously variable from: (a) a position at which either there is no light emitted or the light is barely discernible to a driver who has adapted to dark ambient roadway conditions to (b) a position providing illumination sufficient for the driver to identify the control or display readily under conditions of reduced visibility. Light intensities for informational readout systems shall have at least two values, a higher one for day, and a lower one for nighttime that is provided in the passenger compartment when and only when the headlights are activated shall also be variable in a manner that complies with this paragraph. The light intensity of each telltale shall not be variable and shall be such that, when activated, that telltale and its identification are visible to the driver under all daytime and nighttime conditions.

S6. Conditions. The driver is restrained by the crash protection equipment installed in accordance with the requirements of § 571.208 of this part (Standard No. 208), adjusted in accordance with the manufacturer's instructions.

Joan Claybrook
Administrator

43 F.R. 27541
June 26, 1978

TABLE 1
Identification and Illumination of Controls

| Column 1 | Column 2 | Column 3 | Column 4 |
|--|-----------------------------------|---|--------------|
| Hand Operated Controls | Identifying Words or Abbreviation | Identifying Symbol | Illumination |
| Master Lighting Switch | — |  | — |
| Headlamps and Tail lamps | (Mfr. Option) ² | (Mfr. Option) ² | — |
| Horn | — |  | — |
| Turn Signal | — |  | — |
| Hazard Warning Signal | — |  | Yes |
| Windshield Wiping System | — |  | Yes |
| Windshield Washing System | — |  | Yes |
| Windshield Washing and Wiping Combined | — |  | Yes |
| Heating and or Air Conditioning Fan | — |  | Yes |
| Windshield Defrosting and Defogging System | — |  | Yes |
| Rear Window Defrosting and Defogging System | — |  | Yes |
| Identification, Side Marker and or Clearance Lamps | — |  | Yes |
| Manual Choke | Choke | — | — |
| Engine Start | Engine Start ¹ | — | — |
| Engine Stop | Engine Stop ¹ | — | Yes |
| Hand Throttle | Throttle | — | — |
| Automatic Vehicle Speed | (Mfr. Option) | — | Yes |
| Heating and Air Conditioning System | (Mfr. Option) | (Mfr. Option) | Yes |

¹ Use when engine control is separate from the key locking system.











² Separate identification not required if controlled by master lighting switch.

³ The pair of arrows is a single symbol. When the controls for left and right turn operate independently, however, the two arrows may be considered separate symbols and be spaced accordingly

⁴ Identification not required for vehicles with a GVWR greater the 10,000 lbs., or for narrow ring-type controls








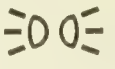
⁵ Framed areas may be filled.

TABLE 1A
Identification and Illumination of Controls

| Column 1 | Column 2 | Column 3 | Column 4 |
|---|--------------------------------------|---|--------------|
| Hand Operated Controls | Identifying Words or Abbreviation | Identifying Symbol | Illumination |
| Headlamps and Tail Lamps | Lights |  ^{2 4} | — |
| Turn Signal | — |  | — |
| Hazard Warning Signal | Hazard |  ⁴ | Yes |
| Clearance Lamps System | Clearance Lamps or Cl Lps |  ^{3 4} | Yes |
| Windshield Wiping System | Wiper or Wipe |  | Yes |
| Windshield Washing System | Washer or Wash |  | Yes |
| Windshield Washing and Wiping Combined | Wash-Wipe |  | Yes |
| Heating and/or Air Conditioning Fan | Fan |  | Yes |
| Windshield Defrosting & Defogging System | Defrost, Defog or Def |  | Yes |
| Rear Window Defrosting and Defogging System | Rear Defrost, Rear Defog or Rear Def |  | Yes |
| Engine Start | Engine Start ¹ | — | — |
| Engine Stop | Engine Stop ¹ | — | Yes |
| Manual Choke | Choke | — | — |
| Hand Throttle | Throttle | — | — |
| Automatic Vehicle Speed | (Mfg Option) | — | Yes |
| Identification Lamps | Identification Lamps or Lps | — | Yes |
| Heating and Air Conditioning System | (Mfg Option) | — | Yes |

1. Use when engine control is separate from the key locking system.
2. Use also when clearance, identification, parking and/or side marker lamps are controlled with the headlamp switch.
3. Use also when clearance lamps, identification lamps and/or side marker are controlled with one switch other than the headlamp switch.
4. Framed areas may be filled.

TABLE 1
Identification and Illumination of Controls

| Column 1 | Column 2 | Column 3 | Column 4 |
|--|-----------------------------------|--|--------------|
| Hand Operated Controls | Identifying Words or Abbreviation | Identifying Symbol | Illumination |
| Master Lighting Switch | _____ |  ⁵ | _____ |
| Headlamps and Tail lamps | (Mfr. Option) ¹ | (Mfr. Option) ² | _____ |
| Horn | _____ |  ⁴ | _____ |
| Turn Signal | _____ |  ³ | _____ |
| Hazard Warning Signal | _____ |  ⁶ | Yes |
| Windshield Wiping System | _____ |  ⁷ | Yes |
| Windshield Washing System | _____ |  ⁸ | Yes |
| Windshield Washing and Wiping Combined | _____ |  ⁹ | Yes |
| Heating and or Air Conditioning Fan | _____ |  ¹⁰ | Yes |
| Windshield Defrosting and Defogging System | _____ |  ¹¹ | Yes |
| Rear Window Defrosting and Defogging System | _____ |  ¹² | Yes |
| Identification, Side Marker and or Clearance Lamps | _____ |  ² ⁵ | Yes |
| Manual Choke | Choke | _____ | _____ |
| Engine Start | Engine Start ¹ | _____ | _____ |
| Engine Stop | Engine Stop ¹ | _____ | Yes |
| Hand Throttle | Throttle | _____ | _____ |
| Automatic Vehicle Speed | (Mfr. Option) | _____ | Yes |
| Heating and Air Conditioning System | (Mfr. Option) | (Mfr. Option) | Yes |

¹ Use when engine control is separate from the key locking system




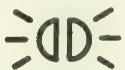






² Separate identification not required if controlled by master lighting switch

³ The pair of arrows is a single symbol. When the controls for left and right turn operate independently, however, the two arrows may be considered separate symbols and be spaced accordingly

⁴ Identification not required for vehicles with a GVWR greater the 10,000 lbs., or for narrow ring-type controls

⁵ Framed areas may be filled.

TABLE 1A
Identification and Illumination of Controls

| Column 1 | Column 2 | Column 3 | Column 4 |
|---|--------------------------------------|---|--------------|
| Hand Operated Controls | Identifying Words or Abbreviation | Identifying Symbol | Illumination |
| Headlamps and Tail Lamps | Lights |  2 4 | — |
| Turn Signal | — |  4 | — |
| Hazard Warning Signal | Hazard |  4 | Yes |
| Clearance Lamps System | Clearance Lamps or Cl Lps |  3 4 | Yes |
| Windshield Wiping System | Wiper or Wipe |  4 | Yes |
| Windshield Washing System | Washer or Wash |  4 | Yes |
| Windshield Washing and Wiping Combined | Wash-Wipe |  4 | Yes |
| Heating and/or Air Conditioning Fan | Fan |  4 | Yes |
| Windshield Defrosting & Defogging System | Defrost, Defog or Def |  4 | Yes |
| Rear Window Defrosting and Defogging System | Rear Defrost, Rear Defog or Rear Def |  4 | Yes |
| Engine Start | Engine Start ¹ | — | — |
| Engine Stop | Engine Stop ¹ | — | Yes |
| Manual Choke | Choke | — | — |
| Hand Throttle | Throttle | — | — |
| Automatic Vehicle Speed | (Mfg Option) | — | Yes |
| Identification Lamps | Identification Lamps or Lps | — | Yes |
| Heating and Air Conditioning System | (Mfg Option) | — | Yes |

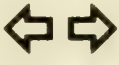







1. Use when engine control is separate from the key locking system.

2. Use also when clearance, identification, parking and/or side marker lamps are controlled with the headlamp switch.

3. Use also when clearance lamps, identification lamps and/or side marker are controlled with one switch other than the headlamp switch.

4. Framed areas may be filled.

TABLE 2
Identification and Illumination of Displays

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 |
|--|----------------------------|---|--|--------------|
| Display | Telltale Color | Identifying Words or Abbreviation | Identifying Symbol | Illumination |
| Turn Signal Telltale | Green | Also see FMVSS 108 |  ¹ ₆ | — |
| Hazard Warning Telltale | Red ⁴ | Also see FMVSS 108 |  ² ₆ | — |
| Seat Belt Telltale | Red ⁴ | Also see FMVSS 208 |  | — |
| <u>Fuel Level</u> Telltale | Yellow | Fuel |  | — |
| Gauge | — | | | Yes |
| <u>Oil Pressure</u> Telltale | Red ⁴ | Oil |  | — |
| Gauge | — | | | Yes |
| <u>Coolant Temperature</u> Telltale | Red ⁴ | Temp |  | — |
| Gauge | — | | | Yes |
| <u>Electrical Charge</u> Telltale | Red ⁴ | Volts, Charge or Amp |  | — |
| Gauge | — | | | Yes |
| Highbeam Telltale | Blue or Green ⁴ | Also see FMVSS 108 |  ⁶ | — |
| <u>Malfunction in</u> <u>Anti-Lock or</u> | Yellow | Antilock or Anti-lock Also see FMVSS 105 | — | — |
| Brake System | Red ⁴ | Brake. Also see FMVSS 105 | — | — |
| Brake Air Pressure Position Telltale | Red ⁴ | Brake Air Also see FMVSS 121 | — | — |
| Speedometer | — | MPH ⁵ | | Yes |
| Odometer | — | — ³ | — | — |
| Automatic Gear Position | — | Also see FMVSS 102 | — | Yes |

¹ The pair of arrows is a single symbol. When the indicator for left and right turn operate independently, however, the two arrows will be considered separate symbols and may be spaced accordingly.

² Not required when arrows of turn signal tell-tales that otherwise operate independently flash simultaneously as hazard warning tell-tale.

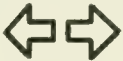







³ If the odometer indicates kilometers, then "KILOMETERS" or "km" shall appear, otherwise, no identification is required.

⁴ Red can be red-orange. Blue can be blue-green

⁵ If the speedometer is graduated in miles per hour and in kilometers per hour, the identifying words or abbreviations shall be "MPH and km h" in any combination of upper or lower case letters

⁶ Framed areas may be filled.

TABLE 2A
Identification and Illumination of Internal Displays

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 |
|--|----------------------------|-----------------------------------|---|------------|
| Display | Tell-Tale Color | Identifying Words or Abbreviation | Identifying Symbol | Illuminate |
| Turn Signal Tell-Tale | Green | Also see FMVSS 108 |  1 5 | — |
| Hazard Warning Tell-Tale | Red ⁴ | Also see FMVSS 108 |  2 5 | — |
| Seat Belt Tell-Tale | Red ⁴ | Also see FMVSS 208 |  | — |
| Fuel Level, Tell-Tale | Yellow | Fuel |  | — |
| Gauge | — | Fuel | | Yes |
| Oil Pressure Tell-Tale | Red ⁴ | Oil |  | — |
| Gauge | — | Oil | | Yes |
| Coolant Temperature Tell-Tale | Red ⁴ | Temp |  | — |
| Gauge | — | Temp | | Yes |
| Electrical Charge Tell-Tale | Red ⁴ | Volts, Charge or Amp |  | — |
| Gauge | — | Volts, Charge or Amp | | Yes |
| Speedometer | — | MPH ⁶ | — | Yes |
| Odometer | — | — ³ | — | — |
| Automatic Gear Position | — | Also see FMVSS 102 | — | Yes |
| High Beam Tell-Tale | Blue or Green ⁴ | Also see FMVSS 108 |  5 | — |
| Brake Air Pressure Position, Tell-Tale | Red ⁴ | Brake Air Also see FMVSS 121 | — | — |
| Malfunction in Anti-Lock or | Yellow | Anti-Lock Also see FMVSS 105-75 | — | — |
| Brake System | Red ⁴ | Brake Also see FMVSS 105-75 | — | — |

1. The pair of arrows is a single symbol. When the indicator for left and right turn operate independently, however, the two arrows will be considered separate symbols and may be spaced accordingly.

2. Not required when arrows of turn signal tell-tales that otherwise operate independently flash simultaneously as hazard warning tell-tale.

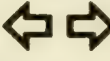



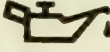



3. If the odometer indicates kilometers, then "KILOMETERS" or "km" shall appear otherwise, no identification is required.

4. Red can be red-orange. Blue can be blue-green.

5. Framed areas may be filled.









6. If the speedometer is graduated in miles per hour and in kilometers per hour, the identifying words or abbreviations shall be "MPH and km/h" in any combination of upper or lower case letters.

TABLE 2
Identification and Illumination of Displays

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 |
|--------------------------------------|----------------------------|---|--|--------------|
| Display | Telltale Color | Identifying Words or Abbreviation | Identifying Symbol | Illumination |
| Turn Signal Telltale | Green | Also see FMVSS 108 |  ¹ ₆ | — |
| Hazard Warning Telltale | Red ⁴ | Also see FMVSS 108 |  ² ₆ | — |
| Seat Belt Telltale | Red ⁴ | Also see FMVSS 208 |  ₁₁₇ | — |
| Fuel Level Telltale | Yellow | Fuel |  ₁₁₇ | — |
| Gauge | — | | | Yes |
| Oil Pressure Telltale | Red ⁴ | Oil |  | — |
| Gauge | — | | | Yes |
| Coolant Temperature Telltale | Red ⁴ | Temp |  | — |
| Gauge | — | | | Yes |
| Electrical Charge Telltale | Red ⁴ | Volts, Charge or Amp |  | — |
| Gauge | — | | | Yes |
| Highbeam Telltale | Blue or Green ⁴ | Also see FMVSS 108 |  ⁶ | — |
| Malfunction in Anti-Lock or | Yellow | Antilock or Anti lock Also see FMVSS 105 | — | — |
| Brake System | Red ⁴ | Brake. Also see FMVSS 105 | — | — |
| Brake Air Pressure Position Telltale | Red ⁴ | Brake Air. Also see FMVSS 121 | — | — |
| Speedometer | — | MPH ⁵ | | Yes |
| Odometer | — | — ³ | — | — |
| Automatic Gear Position | — | Also see FMVSS 102 | — | Yes |

- ¹ The pair of arrows is a single symbol. When the indicator for left and right turn operate independently, however, the two arrows will be considered separate symbols and may be spaced accordingly.
- ² Not required when arrows of turn signal tell-tales that otherwise operate independently flash simultaneously as hazard warning tell-tale.
- ³ If the odometer indicates kilometers, then "KILOMETERS" or "km" shall appear, otherwise, no identification is required.
- ⁴ Red can be red-orange. Blue can be blue-green.
- ⁵ If the speedometer is graduated in miles per hour and in kilometers per hour, the identifying words or abbreviations shall be "MPH and km h" in any combination of upper or lower case letters.
- ⁶ Framed areas may be filled.

TABLE 2A
Identification and Illumination of Internal Displays

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 |
|--|----------------------------|-----------------------------------|---|------------|
| Display | Tell-Tale Color | Identifying Words or Abbreviation | Identifying Symbol | Illuminate |
| Turn Signal Tell-Tale | Green | Also see FMVSS 108 |  1 5 | — |
| Hazard Warning Tell-Tale | Red ⁴ | Also see FMVSS 108 |  2 5 | — |
| Seat Belt Tell-Tale | Red ⁴ | Also see FMVSS 208 |  | — |
| Fuel Level, Tell-Tale | Yellow | Fuel |  | — |
| Gauge | — | Fuel | | Yes |
| Oil Pressure Tell-Tale | Red ⁴ | Oil |  | — |
| Gauge | — | Oil | | Yes |
| Coolant Temperature Tell-Tale | Red ⁴ | Temp |  | — |
| Gauge | — | Temp | | Yes |
| Electrical Charge Tell-Tale | Red ⁴ | Volts, Charge or Amp |  | — |
| Gauge | — | Volts, Charge or Amp | | Yes |
| Speedometer | — | MPH ⁶ | — | Yes |
| Odometer | — | — 3 | — | — |
| Automatic Gear Position | — | Also see FMVSS 102 | — | Yes |
| High Beam Tell-Tale | Blue or Green ⁴ | Also see FMVSS 108 |  5 | — |
| Brake Air Pressure Position, Tell-Tale | Red ⁴ | Brake Air Also see FMVSS 121 | — | — |
| Malfunction in Anti-Lock or | Yellow | Anti-Lock Also see FMVSS 105-75 | — | — |
| Brake System | Red ⁴ | Brake Also see FMVSS 105-75 | — | — |

1. The pair of arrows is a single symbol. When the indicator for left and right turn operate independently, however, the two arrows will be considered separate symbols and may be spaced accordingly.

2. Not required when arrows of turn signal tell-tales that otherwise operate independently flash simultaneously as hazard warning tell-tale.

3. If the odometer indicates kilometers, then "KILOMETERS" or "km" shall appear otherwise, no identification is required.

4. Red can be red-orange. Blue can be blue-green.

5. Framed areas may be filled.

6. If the speedometer is graduated in miles per hour and in kilometers per hour, the identifying words or abbreviations shall be "MPH and km/h" in any combination of upper or lower case letters.

PREAMBLE TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 101-80

Controls and Displays

(Docket No. 1-18; Notice 13)

Action: Final rule.

Summary: This notice expands the application of the standard for the location, identification, and illumination of driver controls and displays (e.g., gauges and meters) by establishing requirements for additional controls and by introducing selected displays which, if furnished, must be located and illuminated under specified conditions and identified by a specified symbol and/or selected word. The purpose of the requirements is to encourage international standardization and harmonization of controls and displays in order to convey information more quickly to drivers and with less chance of human error. This will reduce the interval during which a driver's attention is diverted from the roadway to his controls and displays, thus decreasing the possibility of an accident.

Effective date: September 1, 1980.

For further information contact:

Mr. Nelson Erickson, Office of Motor Vehicle Programs, 400 Seventh Street, S.W., Washington, D.C. 20590, 202-426-2155.

Supplementary information: This notice establishes new requirements for the location, identification, and illumination of controls and displays in passenger cars, multipurpose passenger vehicles, trucks, and buses. The new rule is designated 49 CFR 571.101-80, *Controls and Displays*, and becomes effective September 1, 1980. The existing rule on this subject, 49 CFR 571.101, *Control Location, Identification, and Illumination*, is amended to permit, at the vehicle manufacturer's option, compliance with that standard or the new requirements of Standard No. 101-80 before September 1, 1981.

On October 21, 1976, the National Highway Traffic Safety Administration published (41 FR 46460) a notice proposing to update the existing controls and displays standard (Standard 101) by incorporating all pertinent amendments and interpretations published since the original issuance on January 31, 1967. It also proposed to consolidate the control and display requirements of other standards in one regulation. This notice takes final action on that proposal. All comments were considered and the major ones are discussed below.

The notice issued in October 1976 proposed that most controls and displays be required to be identified with specified symbols which are internationally standardized. Words would have been permitted in addition to the symbols, although the choice of words would have been limited to ensure uniformity. Specified words would have been required for those controls and displays for which no symbols had been established.

The rationale behind the proposed requirement of symbols was that they can convey information more quickly and with less chance of human error than words. This is particularly true with respect to the large foreign language speaking population of this country. By simplifying the identification of controls and displays, the standard should reduce the problems resulting from driver's attention being diverted from the roadway to his controls and displays. An individual benefit cited in the proposed notice is that manufacturers who sell vehicles both in and outside of the United States could realize significant cost savings by utilizing internationally standardized symbols.

The National Motor Vehicle Advisory Council and the Vehicle Equipment Safety Commission did not take positions on the proposal. The majority of commenters favored the use of symbols in the interest of international standardization and harmonization. The final rule, therefore, requires the use of symbols and allows the use of additional words if the manufacturer so chooses.

One of the major concerns of manufacturers commenting was that the proposed rule would inhibit the design and development of electronic "readout" panels which can effectively present to the driver specific information concerning vehicle and environmental conditions affecting safety. These displays are currently capable of exhibiting information and warnings with word messages and not with symbols. The optional use of symbols or words will permit the continued development of informational readout displays. The NHTSA supports the development of more efficient and effective control and display information systems and has, consequently, permitted informational readout displays to be identified by words only so as to not impede the development of electronic displays.

The symbols that are permitted by this rule to identify controls and displays are those developed by the International Standards Organization (ISO). By specifying symbols adopted by the ISO, this agency is facilitating the achievement of an international uniform identification system. New symbols for five controls and eight displays are added to those presently designated in the existing standard. Additional symbols will be added when the NHTSA determines which ones will be readily recognizable, thus reducing driver diversion.

Some commenters noted that a few of the symbols such as the clearance lamp symbol, deviate slightly from those adopted by the ISO. The NHTSA, while basing its symbols on those developed by the ISO, is not specifying ISO symbols which it determines will not adequately convey the intended message. Thus, the symbols proposed in the October notice are adopted, even though some of them deviate from the ISO symbols. Some existing ISO symbols are not included in this final rule due to the fact that additional data are needed on their recognizability. When such data have been accumulated

and analyzed, the NHTSA will determine whether the symbols should be added to Standard 101-80.

A few commenters suggested the deletion of the symbols for the turn signal and high beam telltales because these have long been identified by color and operate only after deliberate operation by the driver. It is the belief of the NHTSA that these symbols should be retained. They are necessary to educate new drivers, to act as reminders to those who drive infrequently, and to further the uniformity and harmonization of symbols. It should be noted that the turn signal was inadvertently omitted from Table I. It was, however, listed in S5.1 as one of the hand-operated controls and discussed in the preamble.

Another question that was raised was whether the manufacturers could use symbols that deviate from those designated in the standard. As stated in previous notices on controls and displays, minor deviations are allowed, as long as the symbol used substantially resembles that specified in the standard.

Several commenters raised concerns about the color of various symbols. The hazard warning telltale was inadvertently designated as green in the proposed rule. That color should be red and the final rule has been corrected to reflect this. Several commenters mentioned that because of the technology of light emitting diodes, telltales are technologically feasible only in yellow, green, or red. One commenter noted that neon gas discharge displays emit a characteristic neon red-orange light, rather than red. These displays rate high in intensity, durability, and reliability and are low in cost. Because of these factors, the final rule has been amended so that a designation of the color red can be either red or red-orange and the color blue may be either blue or blue-green.

Many of those commenting objected to the prohibition of any words other than the words specified in the table. The NHTSA has decided, to permit the manufacturer to use additional words, but only for clarification. For example, the manufacturer may combine an instruction with the specified identification, such as "pull to defrost," or it may use another word for the purpose of clarity, such as "unleaded fuel only."

PREAMBLE TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 101-80

Controls and Displays

(Docket No. 1-18; Notice 13)

Action: Final rule.

Summary: This notice expands the application of the standard for the location, identification, and illumination of driver controls and displays (e.g., gauges and meters) by establishing requirements for additional controls and by introducing selected displays which, if furnished, must be located and illuminated under specified conditions and identified by a specified symbol and/or selected word. The purpose of the requirements is to encourage international standardization and harmonization of controls and displays in order to convey information more quickly to drivers and with less chance of human error. This will reduce the interval during which a driver's attention is diverted from the roadway to his controls and displays, thus decreasing the possibility of an accident.

Effective date: September 1, 1980.

For further information contact:

Mr. Nelson Erickson, Office of Motor Vehicle Programs, 400 Seventh Street, S.W., Washington, D.C. 20590, 202-426-2155.

Supplementary information: This notice establishes new requirements for the location, identification, and illumination of controls and displays in passenger cars, multipurpose passenger vehicles, trucks, and buses. The new rule is designated 49 CFR 571.101-80, *Controls and Displays*, and becomes effective September 1, 1980. The existing rule on this subject, 49 CFR 571.101, *Control Location, Identification, and Illumination*, is amended to permit, at the vehicle manufacturer's option, compliance with that standard or the new requirements of Standard No. 101-80 before September 1, 1981.

On October 21, 1976, the National Highway Traffic Safety Administration published (41 FR 46460) a notice proposing to update the existing controls and displays standard (Standard 101) by incorporating all pertinent amendments and interpretations published since the original issuance on January 31, 1967. It also proposed to consolidate the control and display requirements of other standards in one regulation. This notice takes final action on that proposal. All comments were considered and the major ones are discussed below.

The notice issued in October 1976 proposed that most controls and displays be required to be identified with specified symbols which are internationally standardized. Words would have been permitted in addition to the symbols, although the choice of words would have been limited to ensure uniformity. Specified words would have been required for those controls and displays for which no symbols had been established.

The rationale behind the proposed requirement of symbols was that they can convey information more quickly and with less chance of human error than words. This is particularly true with respect to the large foreign language speaking population of this country. By simplifying the identification of controls and displays, the standard should reduce the problems resulting from driver's attention being diverted from the roadway to his controls and displays. An individual benefit cited in the proposed notice is that manufacturers who sell vehicles both in and outside of the United States could realize significant cost savings by utilizing internationally standardized symbols.

The National Motor Vehicle Advisory Council and the Vehicle Equipment Safety Commission did not take positions on the proposal. The majority of commenters favored the use of symbols in the interest of international standardization and harmonization. The final rule, therefore, requires the use of symbols and allows the use of additional words if the manufacturer so chooses.

One of the major concerns of manufacturers commenting was that the proposed rule would inhibit the design and development of electronic "readout" panels which can effectively present to the driver specific information concerning vehicle and environmental conditions affecting safety. These displays are currently capable of exhibiting information and warnings with word messages and not with symbols. The optional use of symbols or words will permit the continued development of informational readout displays. The NHTSA supports the development of more efficient and effective control and display information systems and has, consequently, permitted informational readout displays to be identified by words only so as to not impede the development of electronic displays.

The symbols that are permitted by this rule to identify controls and displays are those developed by the International Standards Organization (ISO). By specifying symbols adopted by the ISO, this agency is facilitating the achievement of an international uniform identification system. New symbols for five controls and eight displays are added to those presently designated in the existing standard. Additional symbols will be added when the NHTSA determines which ones will be readily recognizable, thus reducing driver diversion.

Some commenters noted that a few of the symbols such as the clearance lamp symbol, deviate slightly from those adopted by the ISO. The NHTSA, while basing its symbols on those developed by the ISO, is not specifying ISO symbols which it determines will not adequately convey the intended message. Thus, the symbols proposed in the October notice are adopted, even though some of them deviate from the ISO symbols. Some existing ISO symbols are not included in this final rule due to the fact that additional data are needed on their recognizability. When such data have been accumulated

and analyzed, the NHTSA will determine whether the symbols should be added to Standard 101-80.

A few commenters suggested the deletion of the symbols for the turn signal and high beam telltales because these have long been identified by color and operate only after deliberate operation by the driver. It is the belief of the NHTSA that these symbols should be retained. They are necessary to educate new drivers, to act as reminders to those who drive infrequently, and to further the uniformity and harmonization of symbols. It should be noted that the turn signal was inadvertently omitted from Table I. It was, however, listed in S5.1 as one of the hand-operated controls and discussed in the preamble.

Another question that was raised was whether the manufacturers could use symbols that deviate from those designated in the standard. As stated in previous notices on controls and displays, minor deviations are allowed, as long as the symbol used substantially resembles that specified in the standard.

Several commenters raised concerns about the color of various symbols. The hazard warning telltale was inadvertently designated as green in the proposed rule. That color should be red and the final rule has been corrected to reflect this. Several commenters mentioned that because of the technology of light emitting diodes, telltales are technologically feasible only in yellow, green, or red. One commenter noted that neon gas discharge displays emit a characteristic neon red-orange light, rather than red. These displays rate high in intensity, durability, and reliability and are low in cost. Because of these factors, the final rule has been amended so that a designation of the color red can be either red or red-orange and the color blue may be either blue or blue-green.

Many of those commenting objected to the prohibition of any words other than the words specified in the table. The NHTSA has decided, to permit the manufacturer to use additional words, but only for clarification. For example, the manufacturer may combine an instruction with the specified identification, such as "pull to defrost," or it may use another word for the purpose of clarity, such as "unleaded fuel only."

The manufacturer will be permitted to describe the "automatic vehicle speed system" in words of his choosing because over the years customers have become used to the various descriptors, such as "cruise control" and "speed control," which manufacturers have used. The NHTSA does not believe that either descriptor is superior to the other. In addition, the manufacturer will be permitted to describe the "automatic gear position" by words of his choosing since these controls are conspicuous and automatic transmissions are not uniform, some not providing a park (P) position and others with additional gears. In response to one question, it should be noted that "automatic gear position" by virtue of its being automatic is not a hand-operated control as referred to in S5.3.1.

In accordance with the suggestions of commenters, the final rule adopts the use of "volts" or "charge" in addition to "amp" for the electrical charge telltale and gauge. Many other alternate words were suggested, but the NHTSA believes that the ones adopted in the final rule best convey the appropriate information. With the allowance of additional words, objection to those required should no longer remain.

Manufacturers of vehicles over 10,000 pounds gross vehicle weight rating (GVWR) objected to the application of this rule to their vehicles. They emphasized that with the increased number of gauges and expanded level of display information utilized by such vehicles, the application of this rule would result in panels that are a "hodgepodge of symbols." It was also asserted that this application would necessitate redesign of the instrument panels, possibly increasing driver diversion instead of decreasing it. Most heavy duty trucks comply with SAE recommendations for the location standardization of controls and displays in the operator's compartment. The operators of vehicles in the heavy duty category are professionals who are familiar with these standardized locations and do not need to read a legend or symbol. In addition, heavy duty trucks are not subject to yearly redesign or model changes. Because of these concerns, the agency has decided that vehicles over 10,000 pounds GVWR need not meet display requirements of this standard. They must, however, meet the control requirements.

A large number of commenters requested that the location of the controls and displays be uniform. An additional request was made to require common carriers to maintain illumination devices on all equipment. While these recommendations are noteworthy, they are not the subject of this rulemaking action, but will be considered for possible future rulemaking.

In the October proposal, it was specified that the control identification be placed on or adjacent to the particular control. The display identification, on the other hand, was to be placed on the display, unless the exposed portion of the lens was in the shape of the required identification. The proposal also stated that the identification of the high-beam indicator and of any gauge could be placed on or adjacent to the display that it identified. In response to the comments that identification could be met equally well by placing the symbol adjacent to the telltale, the NHTSA has decided to leave it up to the manufacturer to determine whether the identification should be placed directly on the control or display or whether an adjacent position would be satisfactory. The final rule does require that the identification be visible to the driver. In response to one commenter, the NHTSA does recognize that the spokes of the steering wheel may at times interfere with the visibility of the controls and displays. The visibility requirement will be satisfied even if the driver needs to make minimal movements toward the front, to the left, and to the right to see the identifications. The NHTSA has determined that these minor necessary movements will have virtually no effect on the safe operation of the vehicle.

The designation of "Km" for kilometres has been corrected in the final rule to read "km". Any odometer that records distance in kilometres must be labeled "KILOMETRES" or "km" so as to avoid confusion. The October 1976 proposal provided an option regarding English or metric units for labeling speedometers. Any proposal setting forth alternatives implicitly carries with it the possibility that one or more of the alternatives may become mandatory. In light of this and in light of the decision in Federal Motor Vehicle Safety Standard No. 127, 43 FR 10919, to require speedometers to record speed in both English and in metric, this rule

requires that both speed scales be labeled so as to avoid confusion. Therefore, for dual readings of MPH and km/h on speedometers the manufacturer is required to clearly label the appropriate display.

The proposed effective date for this rule was September 1, 1979. Due to the numerous comments received, indicating that more lead time would be desirable in order to permit the conversion of controls and displays to coincide with routine redesign of various vehicle models, an effective date of September 1, 1980, has been adopted.

The primary authors of this notice are Mr. Nelson Erickson, Office of Motor Vehicle Pro-

grams, and Ms. Kathleen DeMeter, Office of the Chief Counsel.

In consideration of the foregoing, Part 571 of Title 49 of the Code of Federal Regulations is amended. . . .

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50.)

Issued on June 21, 1978.

Joan Claybrook
Administrator

43 F.R. 27541
June 26, 1978

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43 F.R. 27541
June 26, 1978

PREAMBLE TO AN AMENDMENT TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 101-80

**Control and Display
(Docket 1-18; Notice 18)**

ACTION: Interpretative amendment.

SUMMARY: Standard No. 101-80, Controls and Displays, requires various safety-related controls to be identified by specific symbols. The standard requires identification of the turn signal control unless it is the only control on the left hand side of the steering column. In addition to the turn signal control, some vehicles have additional controls, such as a lever to adjust the position of a tilting steering wheel, on the left hand side of the column. This notice clarifies the identification requirement to provide that a turn signal control does not have to be identified if it is the topmost control on the left side of the steering column, the traditional position for such controls (i.e., the closest control to the steering wheel).

EFFECTIVE DATE: Date of Publication in the October 30, 1980 *Federal Register*.

FOR FURTHER INFORMATION CONTACT:

John Carson, Office of Vehicle Safety Standards, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590 (202-426-2715)

SUPPLEMENTARY INFORMATION: On June 26, 1978, the agency published a final rule establishing Standard No. 101-80, Controls and Displays (43 FR 27541). The standard, which went into effect on September 1, 1980, established new identification and illumination requirements for controls and displays in passenger cars, multipurpose passenger vehicles, trucks and buses.

One provision of the standard requires the turn signal control to be identified by a specific symbol, two horizontal arrowheads, placed on or adjacent to the control. American Motors Corporation (AMC) filed a petition for reconsideration arguing

that the turn signal identification requirement was unnecessary. AMC said that the location and operation of column-mounted turn signal control levers has been standardized by industry practice and is well known to drivers. In response to the AMC petition, NHTSA amended the standard to delete the identification requirement for vehicles in which the turn signal control is the only lever mounted on the left side of the steering column. The agency explained that it was taking this action because the turn signal control has become standardized at that location and there have been no reported crashes caused by the driver's unfamiliarity with the position and use of the turn signal control (Sept. 27, 1979, 44 FR 55580).

Subsequent to the publication of the response to the AMC petition for reconsideration, General Motors (GM) wrote the agency concerning an interpretation of the modified requirements. GM said that on its vehicles equipped with tilt steering columns, there is a tilt mechanism release lever located on the same side of the steering column as the turn signal control lever. GM said that the tilt release lever is "shorter and significantly farther from the steering wheel than the turn signal lever and consequently is out of the immediate finger tip reach of a hand remaining on the steering wheel." GM said that the tilt wheel mechanism is a customer convenience, not a safety feature.

GM argued that its understanding of the agency's interpretation of the modified identification requirement was that the turn signal control only had to be identified "if it is not located and operated in what has become to be considered the standardized manner or if another functional control lever related to vehicle safety could be easily confused with it." GM said that based on that interpretation, it believed that "the presence or absence of a tilt column release lever does not

determine whether the turn signal control must be identified." To assist all interested parties in interpreting the requirement, GM requested the agency to consider revising the language of the standard to clarify the agency's intent.

The purpose of this notice is to make an interpretative amendment to Standard No. 101-80 to clarify the circumstances under which the turn signal control must be identified. As an interpretative amendment, there is no need for notice and comment.

The purpose of the identification requirement is to make it easier for the driver to quickly and correctly locate various safety-related vehicle controls. One of the controls that has been standardized in its location and operation for a number of years is the turn signal control. In every car, that control is mounted on the left hand side of the steering column, is located so that it is the control closest to the rim of the steering wheel, and is operated in a standardized manner, up for right, down for left. Since the turn signal control has been standardized for such a long time, it is not necessary for the control to include an identifying symbol.

As long as the turn signal control is in its standardized location, it will be instantly recognized by drivers even if there are other controls mounted on the same side of the column, farther away from the rim of the steering wheel. Thus, to clarify the identification requirements, the agency is amending the standard. The amendment provides that if the turn signal control is mounted on the left side of the steering column, in a plane essentially parallel to the steering wheel, it need not be identified if it is the control mounted closest to the rim of the steering wheel.

In consideration of the foregoing, Standard No. 101-80 (49 CFR 571.101-80) is revised accordingly.

Issued on October 22, 1980.

Frank Berndt
Acting Administrator

45 FR 71803
October 30, 1980

PREAMBLE TO AN AMENDMENT TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 101-80

**Control and Display
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ACTION: Interpretative amendment.

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GM argued that its understanding of the agency's interpretation of the modified identification requirement was that the turn signal control only had to be identified "if it is not located and operated in what has become to be considered the standardized manner or if another functional control lever related to vehicle safety could be easily confused with it." GM said that based on that interpretation, it believed that "the presence or absence of a tilt column release lever does not

determine whether the turn signal control must be identified." To assist all interested parties in interpreting the requirement, GM requested the agency to consider revising the language of the standard to clarify the agency's intent.

The purpose of this notice is to make an interpretative amendment to Standard No. 101-80 to clarify the circumstances under which the turn signal control must be identified. As an interpretative amendment, there is no need for notice and comment.

The purpose of the identification requirement is to make it easier for the driver to quickly and correctly locate various safety-related vehicle controls. One of the controls that has been standardized in its location and operation for a number of years is the turn signal control. In every car, that control is mounted on the left hand side of the steering column, is located so that it is the control closest to the rim of the steering wheel, and is operated in a standardized manner, up for right, down for left. Since the turn signal control has been standardized for such a long time, it is not necessary for the control to include an identifying symbol.

As long as the turn signal control is in its standardized location, it will be instantly recognized by drivers even if there are other controls mounted on the same side of the column, farther away from the rim of the steering wheel. Thus, to clarify the identification requirements, the agency is amending the standard. The amendment provides that if the turn signal control is mounted on the left side of the steering column, in a plane essentially parallel to the steering wheel, it need not be identified if it is the control mounted closest to the rim of the steering wheel.

In consideration of the foregoing, Standard No. 101-80 (49 CFR 571.101-80) is revised accordingly.

Issued on October 22, 1980.

Frank Berndt
Acting Administrator

45 FR 71803
October 30, 1980

PREAMBLE TO AN AMENDMENT TO PART 571 STANDARD NO. 101-80

Controls and Displays (Docket No. 1-18; Notice 20)

ACTION: Final rule.

SUMMARY: This notice amends Standard No. 101-80, *Controls and Displays*. The standard currently requires the light indicating the actuation of the headlamp high beam to be blue. (Blue is defined by the standard to include blue-green.) This amendment permits manufacturers to use the color green as an alternative to blue. The purpose of the change is to allow the use of light emitting diode technology, which at the present time cannot produce the color blue or blue-green.

EFFECTIVE DATE: January 21, 1982.

SUPPLEMENTARY INFORMATION: Standard No. 101-80, *Controls and Displays*, specifies requirements for the identification and illumination of controls and displays in passenger cars, multipurpose passenger vehicles, trucks and buses. The purpose of the standard is to ensure the accessibility and visibility of motor vehicle controls and displays and to facilitate their quick and proper identification and selection by a driver in order to reduce the safety hazards caused by the diversion of the driver's attention from the driving task, and by mistakes in selecting controls.

Among its requirements, Standard No. 101-80 specifies colors for various vehicle displays. Blue is specified for the headlamp high beam telltale (i.e., the light indicating that the high beams of the headlamps have been activated). A footnote to the standard's color requirements (contained in Table 2 of the standard) states that blue can be blue-green.

This final rule amends the standard by adding green as an alternative to blue and blue-green for the headlamp high beam telltale. This final rule

was preceded by a notice proposing the amendment of Standard No. 101-80 in October 1980 (45 F.R. 71832). Several comments were received that supported the proposal, including those submitted by General Motors, Ford and Chrysler. Only one comment opposed the proposal. The NHTSA has considered all of the comments and the most significant ones are discussed below.

The agency proposed to allow the use of green as an alternative to blue in response to a petition for rulemaking from Volkswagen (VW). Blue had been selected by the agency for the headlamp high beam telltale primarily to promote international harmonization of standards regulating vehicle controls and displays. That color requirement was the same as that adopted by the International Standards Organization, the Economic Commission for Europe and the European Economic Community. VW petitioned for green as an alternative to blue in order to enable it to use light emitting diodes (LED's) for its telltales. VW stated that its testing has demonstrated that LED's are more reliable than incandescent bulbs when used for telltales and are, thus, very desirable. At present, however, LED's cannot be produced in either blue or white (which could be used with a blue filter to produce blue). VW stated that green is the only color akin to blue or blue-green which LED technology is capable of producing.

Ford stated that it supports the proposed amendment since it recognizes current technological limitations and would allow manufacturers to introduce new designs at these limits. Ford did express concern, however, that the proposed relaxation of the color requirement is in conflict with international harmonization of U.S. and European motor vehicle standards. That company recommended that the proposed amendment is issued for an interim period only —

until LED technology can provide commercially acceptable blue LED's. Ford's comment stated that it believes that blue LED's will become commercially feasible for automotive application within the next year.

A comment submitted by General Motors (GM), also supporting the proposed amendment, stated that it believes that the allowance of a green high beam telltale will effectively present the message of that telltale, particularly since it must also be identified by a symbol. According to GM, the amendment will allow incorporation of the current electronic technology involving light emitting diodes into automotive panel displays. GM stated that the allowance of green as a high beam telltale color will not affect international harmonization since blue will remain an alternative. That company noted that any manufacturer desiring to market a product worldwide can still choose to use a blue telltale and thereby meet the international requirements.

The issue of conflict with international harmonization was the basis for the only comment received in opposition to the proposed amendment. The U.S. Technical Research Company (U.S. Technical Representatives of Peugeot) stated that under the present state of technology, LED's can only display yellow, green or red. That company stated that it believes that in the near future an amendment of European regulations will require that the high beam telltale shall be either blue or yellow. According to that commenter, if NHTSA chooses to adopt green for the high beam telltale, harmonization in this field will no longer exist and domestic and foreign manufacturers will be equally affected. The U.S. Technical Research Company therefore requested that NHTSA retain the blue requirement because it is identical to the current European requirement. Alternatively, that company asked the agency to require that either blue or yellow telltales be used in anticipation of the possible change in the European requirements.

In the interest of international harmonization of standards, Renault also supported permitting the use of yellow. However, it also supported allowing the use of green as an alternative to blue.

The purpose of requiring telltales to be of a particular color is to promote standardization and thereby improve driver performance. As noted

above, the agency adopted blue for the high beam telltale primarily to promote international harmonization. The International Standards Organization, the Economic Commission for Europe and the European Economic Community all maintain that color requirement.

The agency does not believe that permitting the use of green as an alternative to blue is in conflict with international harmonization. As noted by GM, any manufacturer desiring to market a product worldwide can still choose to use a blue telltale and thereby meet the international requirements. While the agency is aware that some manufacturers and some countries in Europe have sought to have international standards amended to permit use of yellow as an alternative to blue, it is by no means certain that those efforts will succeed. Indeed, the International Standards Organization rejected such a proposal in April 1980.

In light of the uncertainty of the direction in which international requirements will move on this matter, the agency determined that yellow should not be adopted as an alternative to blue. The agency agrees with VW's petition that green is the closest color akin to blue or blue-green that LED's can produce and thus, in the agency's judgment, is the best alternative color to permit. To permit use of yellow as well would defeat the purpose of having a color requirement in the first place, that of promoting standardization and thereby improving driver performance. Therefore, that alternative was rejected.

The agency recognizes that the cause of international harmonization may make amendment of Standard No. 101-80 appropriate if international organizations adopt yellow as an alternative to blue. The agency will monitor developments in this area.

In the interest of both standardization and international harmonization, the agency believes that use of green as an alternative to blue should only be permitted until LED technology develops to the point that it is possible to produce commercially acceptable blue LED's. The agency considered amending the standard to permit use of green for a specified period of time, such as three years. However, without more definite information indicating when commercially acceptable blue LED's will be available, the agency determined that it would be more

PREAMBLE TO AN AMENDMENT TO PART 571 STANDARD NO. 101-80

Controls and Displays (Docket No. 1-18; Notice 20)

ACTION: Final rule.

SUMMARY: This notice amends Standard No. 101-80, *Controls and Displays*. The standard currently requires the light indicating the actuation of the headlamp high beam to be blue. (Blue is defined by the standard to include blue-green.) This amendment permits manufacturers to use the color green as an alternative to blue. The purpose of the change is to allow the use of light emitting diode technology, which at the present time cannot produce the color blue or blue-green.

EFFECTIVE DATE: January 21, 1982.

SUPPLEMENTARY INFORMATION: Standard No. 101-80, *Controls and Displays*, specifies requirements for the identification and illumination of controls and displays in passenger cars, multipurpose passenger vehicles, trucks and buses. The purpose of the standard is to ensure the accessibility and visibility of motor vehicle controls and displays and to facilitate their quick and proper identification and selection by a driver in order to reduce the safety hazards caused by the diversion of the driver's attention from the driving task, and by mistakes in selecting controls.

Among its requirements, Standard No. 101-80 specifies colors for various vehicle displays. Blue is specified for the headlamp high beam telltale (i.e., the light indicating that the high beams of the headlamps have been activated). A footnote to the standard's color requirements (contained in Table 2 of the standard) states that blue can be blue-green.

This final rule amends the standard by adding green as an alternative to blue and blue-green for the headlamp high beam telltale. This final rule

was preceded by a notice proposing the amendment of Standard No. 101-80 in October 1980 (45 F.R. 71832). Several comments were received that supported the proposal, including those submitted by General Motors, Ford and Chrysler. Only one comment opposed the proposal. The NHTSA has considered all of the comments and the most significant ones are discussed below.

The agency proposed to allow the use of green as an alternative to blue in response to a petition for rulemaking from Volkswagen (VW). Blue had been selected by the agency for the headlamp high beam telltale primarily to promote international harmonization of standards regulating vehicle controls and displays. That color requirement was the same as that adopted by the International Standards Organization, the Economic Commission for Europe and the European Economic Community. VW petitioned for green as an alternative to blue in order to enable it to use light emitting diodes (LED's) for its telltales. VW stated that its testing has demonstrated that LED's are more reliable than incandescent bulbs when used for telltales and are, thus, very desirable. At present, however, LED's cannot be produced in either blue or white (which could be used with a blue filter to produce blue). VW stated that green is the only color akin to blue or blue-green which LED technology is capable of producing.

Ford stated that it supports the proposed amendment since it recognizes current technological limitations and would allow manufacturers to introduce new designs at these limits. Ford did express concern, however, that the proposed relaxation of the color requirement is in conflict with international harmonization of U.S. and European motor vehicle standards. That company recommended that the proposed amendment is issued for an interim period only —

until LED technology can provide commercially acceptable blue LED's. Ford's comment stated that it believes that blue LED's will become commercially feasible for automotive application within the next year.

A comment submitted by General Motors (GM), also supporting the proposed amendment, stated that it believes that the allowance of a green high beam telltale will effectively present the message of that telltale, particularly since it must also be identified by a symbol. According to GM, the amendment will allow incorporation of the current electronic technology involving light emitting diodes into automotive panel displays. GM stated that the allowance of green as a high beam telltale color will not affect international harmonization since blue will remain an alternative. That company noted that any manufacturer desiring to market a product worldwide can still choose to use a blue telltale and thereby meet the international requirements.

The issue of conflict with international harmonization was the basis for the only comment received in opposition to the proposed amendment. The U.S. Technical Research Company (U.S. Technical Representatives of Peugeot) stated that under the present state of technology, LED's can only display yellow, green or red. That company stated that it believes that in the near future an amendment of European regulations will require that the high beam telltale shall be either blue or yellow. According to that commenter, if NHTSA chooses to adopt green for the high beam telltale, harmonization in this field will no longer exist and domestic and foreign manufacturers will be equally affected. The U.S. Technical Research Company therefore requested that NHTSA retain the blue requirement because it is identical to the current European requirement. Alternatively, that company asked the agency to require that either blue or yellow telltales be used in anticipation of the possible change in the European requirements.

In the interest of international harmonization of standards, Renault also supported permitting the use of yellow. However, it also supported allowing the use of green as an alternative to blue.

The purpose of requiring telltales to be of a particular color is to promote standardization and thereby improve driver performance. As noted

above, the agency adopted blue for the high beam telltale primarily to promote international harmonization. The International Standards Organization, the Economic Commission for Europe and the European Economic Community all maintain that color requirement.

The agency does not believe that permitting the use of green as an alternative to blue is in conflict with international harmonization. As noted by GM, any manufacturer desiring to market a product worldwide can still choose to use a blue telltale and thereby meet the international requirements. While the agency is aware that some manufacturers and some countries in Europe have sought to have international standards amended to permit use of yellow as an alternative to blue, it is by no means certain that those efforts will succeed. Indeed, the International Standards Organization rejected such a proposal in April 1980.

In light of the uncertainty of the direction in which international requirements will move on this matter, the agency determined that yellow should not be adopted as an alternative to blue. The agency agrees with VW's petition that green is the closest color akin to blue or blue-green that LED's can produce and thus, in the agency's judgment, is the best alternative color to permit. To permit use of yellow as well would defeat the purpose of having a color requirement in the first place, that of promoting standardization and thereby improving driver performance. Therefore, that alternative was rejected.

The agency recognizes that the cause of international harmonization may make amendment of Standard No. 101-80 appropriate if international organizations adopt yellow as an alternative to blue. The agency will monitor developments in this area.

In the interest of both standardization and international harmonization, the agency believes that use of green as an alternative to blue should only be permitted until LED technology develops to the point that it is possible to produce commercially acceptable blue LED's. The agency considered amending the standard to permit use of green for a specified period of time, such as three years. However, without more definite information indicating when commercially acceptable blue LED's will be available, the agency determined that it would be more

appropriate to issue the amendment for an indefinite period of time. The agency will consider limiting high beam telltales to blue after blue LED technology has been developed.

The agency does not believe that this amendment will have any adverse effect on safety. Even if it did, the effect would be more than outweighed by the advantages offered by permitting industry the flexibility to use LED technology for telltales. As VW pointed out, there is evidence that LED's are more reliable than incandescent bulbs.

Comments submitted by Ford and VDO-ARGO stated that they see no adverse effect on safety as a result of this amendment. Further, as noted above, GM stated that it believes that a green high beam telltale will effectively present the message of that telltale, particularly since it must also be identified by symbol. No comments were received that suggested any adverse effect.

Also, there may be cost savings and other advantages associated with permitting LED's to be used for telltales. Standard No. 101-80 already permits LED's to be used for other displays. The standard defines displays that use LED's to give one or more than one type of information or message (i.e., using words or symbols) as informational readout displays. Recently the agency granted a petition for rulemaking from GM that requested modification in Standard No. 101-80's light intensity requirements to permit informational readout displays to be used for telltales. According to GM, such an amendment would permit integration of telltales with other instrument displays in a single electronic display panel. This step would alleviate instrument panel design problems caused by reduced space available due to vehicle downsizing and increasing amounts and types of information to be presented to the driver, offer potential for weight and cost reduction, and facilitate placing telltales adjacent to displays often consulted by the driver, making

the telltales more readily noticeable. These same types of advantages are offered by permitting displays which use LED's, but are not informational readout displays (since they consist only of a colored light and do not display words or symbols), as telltales.

The agency has assessed the economic and other impacts of this final rule and determined that it is neither a major rule within the meaning of Executive Order 12291 nor a significant rule under the Department of Transportation's regulatory policies and procedures. Further, the agency concludes that the economic and other consequences of this final rule are so minimal as not to require preparation of a regulatory evaluation. The impact is minimal because the amendment does not impose any new requirements and does not affect compliance costs. Rather, it merely permits manufacturers to use an alternate color for the high beam telltale. For the same reasons, the agency finds that the amendment will have no significant environmental impact.

Although NHTSA has considered the effects of this amendment on small businesses, the agency has not prepared a regulatory flexibility analysis. Such an analysis is not necessary in this case, since the Regulatory Flexibility Act applies only to rules for which an NPRM was issued on or after January 1, 1981. The NPRM for this final rule was published in October 1980.

Issued on January 2, 1982.

Raymond A. Peck, Jr.
Administrator

47 F.R. 2996
January 21, 1982

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The agency does not believe that this amendment will have any adverse effect on safety. Even if it did, the effect would be more than outweighed by the advantages offered by permitting industry the flexibility to use LED technology for telltales. As VW pointed out, there is evidence that LED's are more reliable than incandescent bulbs.

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Issued on January 2, 1982.

Raymond A. Peck, Jr.
Administrator

47 F.R. 2996
January 21, 1982

MOTOR VEHICLE SAFETY STANDARD NO. 102

Transmission Shift Lever Sequence, Starter Interlock, and Transmission Braking Effect— Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses

S1. Purpose and scope. This standard specifies the requirements for the transmission shift lever sequence, a starter interlock, and for a braking effect of automatic transmissions, to reduce the likelihood of shifting errors, starter engagement with vehicle in drive position, and to provide supplemental braking at speeds below 25 miles per hour.

S2. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S3. Requirements.

S3.1 Automatic transmissions.

S3.1.1 Location of transmission shift lever positions on passenger cars. A neutral position shall be located between forward drive and reverse drive positions. If a steering-column-mounted transmission shift lever is used, movement from neutral position to forward drive position shall be clockwise. If the transmission shift lever sequence includes a park position, it shall be lo-

cated at the end, adjacent to the reverse drive position.

S3.1.2 Transmission braking effect. In vehicles having more than one forward transmission gear ratio, one forward drive position shall provide a greater degree of engine braking than the highest speed transmission ratio at vehicle speeds below 25 miles per hour.

S3.1.3 Starter interlock. The engine starter shall be inoperative when the transmission shift lever is in a forward or reverse drive position.

S3.2 Automatic and manual transmissions.

Identification of shift lever positions of automatic transmissions, and of the shift lever pattern of manual transmissions, except three forward speed manual transmissions having the standard "H" pattern, shall be permanently displayed in view of the driver.

32 F.R. 2410

February 3, 1967

MOTOR VEHICLE SAFETY STANDARD NO. 102

Transmission Shift Lever Sequence, Starter Interlock, and Transmission Braking Effect— Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses

S1. Purpose and scope. This standard specifies the requirements for the transmission shift lever sequence, a starter interlock, and for a braking effect of automatic transmissions, to reduce the likelihood of shifting errors, starter engagement with vehicle in drive position, and to provide supplemental braking at speeds below 25 miles per hour.

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32 F.R. 2410

February 3, 1967

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 103**Windshield Defrosting and Defogging Systems—Passenger Cars,
Multipurpose Passenger Vehicles, Trucks and Buses****(Docket Nos. 9, 1-12)**

Motor Vehicle Safety Standard No. 103 (32 F.R. 2410) requires that each passenger car and multipurpose passenger vehicle manufactured for sale in the Continental United States be provided with a windshield defrosting and defogging system. A proposal to amend section 371.21 of Part 371, Federal Motor Vehicle Safety Standards, by amending Standard No. 103, was published in the *Federal Register* on December 28, 1967 (32 F.R. 20867).

Interested persons have been afforded an opportunity to participate in the making of the amendment. Their comments, as well as other available information, have been carefully considered.

The purpose of the amendment is to increase driver visibility, and thereby enhance safe vehicle performance, by (1) adding test conditions and performance requirements for passenger car defrosting and defogging systems; and (2) broadening the standard's application to cover trucks and buses, which were not subject to the initial standard. In addition, the standard was modified to improve its clarity.

Paragraph S4.3 in the notice of proposed rulemaking required testing of passenger car windshield defrosting and defogging systems in accordance with the test conditions specified in paragraph 4 of SAE Recommended Practice J902, August 1964. Several comments asked that this requirement be modified to permit optional use of the test conditions set out in paragraph 4 of SAE Recommended Practice J902a, March 1967, a revised version of the Recommended Practice. The Administrator has determined that there are only minor differences between the test equipment, instrumentation, conditions and procedures in paragraphs 4.1 through 4.4.7 of these

two versions, and that these minor differences do not affect the level of safety attained with the use of either one. Accordingly, S4.3 of the notice has been changed to permit the use of the demonstration procedures described in paragraphs 4.1 through 4.4.7 of either SAE Recommended Practice J902 or SAE Recommended Practice J902a.

Another feature of paragraph S4.3 which evoked comments was its provision for use of the test procedures in section 4 of Recommended Practice J902 to the extent they are "applicable to" the particular system being tested. Any possible ambiguity that might appear upon superficial examination of the quoted words disappears when this requirement is read in conjunction with the operative provisions of section 4 of the SAE Recommended Practices. Section 4 makes reference to certain components that are not incorporated in every passenger car (e.g. defroster blowers). The use of the section 4 test procedures is restricted to those procedures "applicable to" the particular passenger car system being tested to make it clear that procedures which, by their terms, apply to components that are not a part of the car being tested need not be complied with.

Three comments asked that paragraph S4.2 of the standard be changed to permit optional use of the defrosted area and defrosting time requirements prescribed in section 8 of SAE Recommended Practice J902a in lieu of those set forth in section 3 of Recommended Practice J902. In the notice of proposed rulemaking, paragraph S4.2 incorporated, with minor modifications, the defrosted area and defrosting time requirements of Recommended Practice J902. Comparison of the two versions of the SAE Recommended Practice reveals that there are great differences between the areas and times

Effective: January 1, 1969

prescribed by J902 and those prescribed by J902a. The requests for a change in paragraph S4.2 acknowledged that compliance with one procedure is not necessarily more difficult than compliance with the other. The submissions did not indicate that adherence to the J902 requirements would impose any significant burden or would be impracticable in any sense. In view of the absence of sufficient substantiation to justify changing the standard, paragraph S4.2 has not been modified to allow alternative defrosted area and defrosting time requirements.

One comment requested that the standard be changed to allow 5 minutes more to meet the defrosted area requirements of the critical or "C" area. It was said that reasonable performance tolerances should be taken into account, and that, therefore, the requirement of paragraph 3.1 of SAE Recommended Practice J902, as adopted in modified form in paragraph S4.2 of the standard, that the "C" area must be 80 percent defrosted after 20 minutes of operation should be changed to allow manufacturers 25 minutes to attain the 80 percent defrosted goal. Such a modification would permit a significant reduction of the defrosting performance of defrosting and defogging systems and this, in turn, would be contrary to the interest of safety. While it is true that variations in such things as the performance of the thermostat and the outlet nozzle will affect the system's capability to defrost a given windshield area within a stated time, there

is no apparent reason why it is impracticable to design and construct the system so that, at a minimum performance level, it will comply with the requirements of paragraph S4.2. For these reasons, the Administrator has rejected this request for modification of the standard.

Many comments submitted suggestions that went beyond the scope of the notice. For example, submissions that discussed the problems of establishing performance requirements for defrosting and defogging systems on multipurpose passenger vehicles, trucks, and buses were received. These, and other comments of this nature, will be considered in connection with future rulemaking action.

In consideration of the foregoing, § 371.21 of Part 371, Federal Motor Vehicle Safety Standards, is amended, effective January 1, 1969, by amending Motor Vehicle Safety Standard No. 103

This amendment is made under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority of April 24, 1968.

Issued in Washington, D. C. on April 24, 1968.

Lowell K. Bridwell,
Federal Highway Administrator.

33 F.R. 6468
April 27, 1968

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 103**Windshield Defrosting and Defogging Systems—Passenger Cars,
Multipurpose Passenger Vehicles, Trucks and Buses****(Docket Nos. 9, 1–12)**

Motor Vehicle Safety Standard No. 103 (32 F.R. 2410) requires that each passenger car and multipurpose passenger vehicle manufactured for sale in the Continental United States be provided with a windshield defrosting and defogging system. A proposal to amend section 371.21 of Part 371, Federal Motor Vehicle Safety Standards, by amending Standard No. 103, was published in the *Federal Register* on December 28, 1967 (32 F.R. 20867).

Interested persons have been afforded an opportunity to participate in the making of the amendment. Their comments, as well as other available information, have been carefully considered.

The purpose of the amendment is to increase driver visibility, and thereby enhance safe vehicle performance, by (1) adding test conditions and performance requirements for passenger car defrosting and defogging systems; and (2) broadening the standard's application to cover trucks and buses, which were not subject to the initial standard. In addition, the standard was modified to improve its clarity.

Paragraph S4.3 in the notice of proposed rulemaking required testing of passenger car windshield defrosting and defogging systems in accordance with the test conditions specified in paragraph 4 of SAE Recommended Practice J902, August 1964. Several comments asked that this requirement be modified to permit optional use of the test conditions set out in paragraph 4 of SAE Recommended Practice J902a, March 1967, a revised version of the Recommended Practice. The Administrator has determined that there are only minor differences between the test equipment, instrumentation, conditions and procedures in paragraphs 4.1 through 4.4.7 of these

two versions, and that these minor differences do not affect the level of safety attained with the use of either one. Accordingly, S4.3 of the notice has been changed to permit the use of the demonstration procedures described in paragraphs 4.1 through 4.4.7 of either SAE Recommended Practice J902 or SAE Recommended Practice J902a.

Another feature of paragraph S4.3 which evoked comments was its provision for use of the test procedures in section 4 of Recommended Practice J902 to the extent they are "applicable to" the particular system being tested. Any possible ambiguity that might appear upon superficial examination of the quoted words disappears when this requirement is read in conjunction with the operative provisions of section 4 of the SAE Recommended Practices. Section 4 makes reference to certain components that are not incorporated in every passenger car (e.g. defroster blowers). The use of the section 4 test procedures is restricted to those procedures "applicable to" the particular passenger car system being tested to make it clear that procedures which, by their terms, apply to components that are not a part of the car being tested need not be complied with.

Three comments asked that paragraph S4.2 of the standard be changed to permit optional use of the defrosted area and defrosting time requirements prescribed in section 3 of SAE Recommended Practice J902a in lieu of those set forth in section 3 of Recommended Practice J902. In the notice of proposed rulemaking, paragraph S4.2 incorporated, with minor modifications, the defrosted area and defrosting time requirements of Recommended Practice J902. Comparison of the two versions of the SAE Recommended Practice reveals that there are great differences between the areas and times

Effective: January 1, 1969

prescribed by J902 and those prescribed by J902a. The requests for a change in paragraph S4.2 acknowledged that compliance with one procedure is not necessarily more difficult than compliance with the other. The submissions did not indicate that adherence to the J902 requirements would impose any significant burden or would be impracticable in any sense. In view of the absence of sufficient substantiation to justify changing the standard, paragraph S4.2 has not been modified to allow alternative defrosted area and defrosting time requirements.

One comment requested that the standard be changed to allow 5 minutes more to meet the defrosted area requirements of the critical or "C" area. It was said that reasonable performance tolerances should be taken into account, and that, therefore, the requirement of paragraph 3.1 of SAE Recommended Practice J902, as adopted in modified form in paragraph S4.2 of the standard, that the "C" area must be 80 percent defrosted after 20 minutes of operation should be changed to allow manufacturers 25 minutes to attain the 80 percent defrosted goal. Such a modification would permit a significant reduction of the defrosting performance of defrosting and defogging systems and this, in turn, would be contrary to the interest of safety. While it is true that variations in such things as the performance of the thermostat and the outlet nozzle will affect the system's capability to defrost a given windshield area within a stated time, there

is no apparent reason why it is impracticable to design and construct the system so that, at a minimum performance level, it will comply with the requirements of paragraph S4.2. For these reasons, the Administrator has rejected this request for modification of the standard.

Many comments submitted suggestions that went beyond the scope of the notice. For example, submissions that discussed the problems of establishing performance requirements for defrosting and defogging systems on multipurpose passenger vehicles, trucks, and buses were received. These, and other comments of this nature, will be considered in connection with future rulemaking action.

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Issued in Washington, D. C. on April 24, 1968.

Lowell K. Bridwell,
Federal Highway Administrator.

33 F.R. 6468
April 27, 1968

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 103 **Windshield Defrosting and Defogging Systems**

(Docket No. 73-6; Notice 2)

The purpose of this notice is to amend Motor Vehicle Safety Standard No. 103, *Windshield Defrosting and Defogging Systems*, to revise the wind test condition.

On March 20, 1973, the National Highway Traffic Safety Administration published a notice (38 F.R. 7339) proposing a change in the standard's wind velocity test condition which would clarify the NHTSA's intent that the performance requirements be met at all levels within the specified wind speed range. The present provision specifying that "the wind velocity may not exceed 5 mph" may be interpreted by manufacturers as requiring compliance at only one point within the range. Such an interpretation could result in enforcement problems if the NHTSA discovered a failure to comply when testing a vehicle at one point within the range while the manufacturer had attained compliance during testing at another point within the specified wind speed range. Perpetuation of this type of enforcement situation might retard the development of complying vehicle systems and undermine the level of performance the NHTSA intends to accomplish. Therefore, the NHTSA proposed in its March 20, 1973, notice that the standard specify that the wind velocity test condition be at any level from 0 to 2 mph. Reading this requirement together with the interpretive provisions of § 571.4, the vehicle would be required to be capable of complying with the standard when the wind velocity is at any speed within that range. This would prevent any discrepancy between the manufacturers' and the NHTSA's conception of what the standard actually requires.

Several comments submitted in response to the proposal to revise the wind speed test condition asserted that wind speeds cannot be accurately measured below 2 mph, and therefore the requirement should remain unchanged. This objection lacks merit, since the standard only requires that a vehicle be *capable* of complying with the standard at wind speeds from 0 to 2 mph. A manufacturer may generally conduct his testing at higher wind speeds to determine compliance, since the greater the wind speed, the more difficult it is to defrost the windshield within the specified time span.

The March 20, 1973, notice also proposed that the test chamber temperature sensor be located in a position not substantially affected by the heat from the engine. Comments from Ford and General Motors, submitted in response to this aspect of the proposal, objected to the proposed temperature location as unobjective and ambiguous and suggested establishment of a more specific location. The NHTSA is in tentative agreement with commenters' suggestion and is proposing in a separate notice issued today an exact location for the temperature sensor.

In consideration of the foregoing, in S4.3 of 49 CFR § 571.103, Motor Vehicle Safety Standard No. 103, paragraph (g) is amended. . . .

Effective date: September 1, 1975.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on March 17, 1975.

James B. Gregory
Administrator

40 F.R. 12991
March 24, 1975



PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 103
Windshield Defrosting and Defogging Systems
(Docket No. 73-6; Notice 2)

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Several comments submitted in response to the proposal to revise the wind speed test condition asserted that wind speeds cannot be accurately measured below 2 mph, and therefore the requirement should remain unchanged. This objection lacks merit, since the standard only requires that a vehicle be *capable* of complying with the standard at wind speeds from 0 to 2 mph. A manufacturer may generally conduct his testing at higher wind speeds to determine compliance, since the greater the wind speed, the more difficult it is to defrost the windshield within the specified time span.

The March 20, 1973, notice also proposed that the test chamber temperature sensor be located in a position not substantially affected by the heat from the engine. Comments from Ford and General Motors, submitted in response to this aspect of the proposal, objected to the proposed temperature location as unobjective and ambiguous and suggested establishment of a more specific location. The NHTSA is in tentative agreement with commenters' suggestion and is proposing in a separate notice issued today an exact location for the temperature sensor.

In consideration of the foregoing, in S4.3 of 49 CFR § 571.103, Motor Vehicle Safety Standard No. 103, paragraph (g) is amended. . . .

Effective date: September 1, 1975.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on March 17, 1975.

James B. Gregory
 Administrator
 40 F.R. 12991
 March 24, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 103**Windshield Defrosting and Defogging Systems**

(Docket No. 73-6; Notice 4)

The purpose of this notice is to amend Motor Vehicle Safety Standard No. 103, *Windshield Defrosting and Defogging Systems*, 49 CFR 571.103, to specify a relocation of the test chamber temperature and wind velocity sensors.

On March 24, 1975, the National Highway Traffic Safety Administration published a notice (40 F.R. 13002) proposing a change in the location of the test chamber temperature and wind velocity sensors to a position where they would not be affected by air released from vehicle engines during testing. A petition from Jaguar Cars Division of British Leyland UK Limited, describing compliance problems for vehicles that direct engine heat at the windshield as part of the defrosting process, prompted the rulemaking action.

It was proposed that the temperature and wind sensors be positioned at the forwardmost point of the vehicle or 36 inches from the base of the windshield, whichever is farther forward, at a level halfway between top and bottom of the windshield. At this location, the NHTSA concluded that the temperature measurement would not be affected by expelled engine heat and the wind measurement would not be affected by air released from hood ducts.

Comments to the proposal were received from Chrysler, Jaguar, and General Motors. Both Chrysler and General Motors supported adoption of the amendment.

Jaguar took issue with the proposed thermocouple location and asked that the sensors be placed 3 feet forward of the vehicle. The NHTSA denies this request, having found that the proposed thermocouple position provides for reliable and objective temperature and wind velocity measurements. Location of the sensors at the position suggested by Jaguar is therefore unnecessary and would tend to penalize those manufacturers using short cold chambers for compliance testing. The purpose of the amendment is to relocate the temperature and wind sensors to locations where they will not be affected by air released from vehicle engines. The agency concludes that the proposed location accomplishes this goal and should therefore be adopted.

In consideration of the foregoing, Standard No. 103 (49 CFR 571.103) is amended by adding in S4.3 a new paragraph (h) . . .

Effective date: September 1, 1975.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on July 28, 1975.

James B. Gregory
Administrator

40 F.R. 32336
August 1, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 103**Windshield Defrosting and Defogging Systems**

(Docket No. 73-6; Notice 4)

The purpose of this notice is to amend Motor Vehicle Safety Standard No. 103, *Windshield Defrosting and Defogging Systems*, 49 CFR 571.103, to specify a relocation of the test chamber temperature and wind velocity sensors.

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Comments to the proposal were received from Chrysler, Jaguar, and General Motors. Both Chrysler and General Motors supported adoption of the amendment.

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In consideration of the foregoing, Standard No. 103 (49 CFR 571.103) is amended by adding in S4.3 a new paragraph (h)....

Effective date: September 1, 1975.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

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MOTOR VEHICLE SAFETY STANDARD NO. 103

Windshield Defrosting and Defogging Systems—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses

S1. Scope. This standard specifies requirements for windshield defrosting and defogging systems.

S2. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses, manufactured for sale in the Continental United States.

S3. Definitions. "Road load" means the power output required to move a given motor vehicle at curb weight plus 400 pounds on level, clean, dry, smooth Portland cement concrete pavement (or other surface with equivalent coefficient of surface friction) at a specified speed through still air at 68°F and standard barometric pressure (29.92" of Hg.) and includes driveline friction, rolling friction, and air resistance.

S4. Requirements.

S4.1 Each vehicle shall have a windshield defrosting and defogging system.

S4.2 Each passenger car windshield defrosting and defogging system shall meet the requirements of section 3 of SAE Recommended Practice J902, "Passenger Car Windshield Defrosting Systems," August 1964, when tested in accordance with S4.3, except that "the critical area" specified in paragraph 3.1 of SAE Recommended Practice J902 shall be that established as Area C in accordance with Motor Vehicle Safety Standard No. 104, "Windshield Wiping and Washing Systems," and "the entire windshield" specified in paragraph 3.3 of SAE Recommended Practice J902 shall be that established as Area A in accordance with Motor Vehicle Safety Standard No. 104.

S4.3 Demonstration procedure. The passenger car windshield defrosting and defogging system shall be tested in accordance with the portions of paragraphs 4.1 through 4.4.7 of SAE Recom-

mended Practice J902, August 1964, or SAE Recommended Practice J902a, March 1967, applicable to that system, except that—

(a) During the first five minutes of the test, the engine speed or speeds may be those which the manufacturer recommends as the warm-up procedure for cold weather starting;

(b) During the last 35 minutes of the test period (or the entire test period if the five-minute warm-up procedure is not used), either—

(i) The engine speed shall not exceed 1500 rpm in neutral gear; or

(ii) The engine speed and load shall not exceed the speed and load at 25 mph in the manufacturer's recommended gear with road load;

(c) A room air change of 90 times per hour is not required;

(d) The windshield wipers may be used during the test if they are operated without manual assist;

(e) One or two windows may be open a total of one inch;

(f) The defroster blower may be turned on at any time; and

(g) The wind velocity is at any level from 0 to 2 mph.

(h) The test chamber temperature and the wind velocity shall be measured, after the engine has been started, at the forwardmost point of the vehicle or a point 36 inches from the base of the windshield, whichever is farther forward, at a level halfway between the top and bottom of the windshield on the vehicle centerline.

33 F.R. 6469
April 27, 1968

MOTOR VEHICLE SAFETY STANDARD NO. 103

Windshield Defrosting and Defogging Systems—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses

S1. Scope. This standard specifies requirements for windshield defrosting and defogging systems.

S2. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses, manufactured for sale in the Continental United States.

S3. Definitions. "Road load" means the power output required to move a given motor vehicle at curb weight plus 400 pounds on level, clean, dry, smooth Portland cement concrete pavement (or other surface with equivalent coefficient of surface friction) at a specified speed through still air at 68°F and standard barometric pressure (29.92" of Hg.) and includes driveline friction, rolling friction, and air resistance.

S4. Requirements.

S4.1 Each vehicle shall have a windshield defrosting and defogging system.

S4.2 Each passenger car windshield defrosting and defogging system shall meet the requirements of section 3 of SAE Recommended Practice J902, "Passenger Car Windshield Defrosting Systems," August 1964, when tested in accordance with S4.3, except that "the critical area" specified in paragraph 3.1 of SAE Recommended Practice J902 shall be that established as Area C in accordance with Motor Vehicle Safety Standard No. 104, "Windshield Wiping and Washing Systems," and "the entire windshield" specified in paragraph 3.3 of SAE Recommended Practice J902 shall be that established as Area A in accordance with Motor Vehicle Safety Standard No. 104.

S4.3 Demonstration procedure. The passenger car windshield defrosting and defogging system shall be tested in accordance with the portions of paragraphs 4.1 through 4.4.7 of SAE Recom-

mended Practice J902, August 1964, or SAE Recommended Practice J902a, March 1967, applicable to that system, except that—

(a) During the first five minutes of the test, the engine speed or speeds may be those which the manufacturer recommends as the warm-up procedure for cold weather starting;

(b) During the last 35 minutes of the test period (or the entire test period if the five-minute warm-up procedure is not used), either—

(i) The engine speed shall not exceed 1500 rpm in neutral gear; or

(ii) The engine speed and load shall not exceed the speed and load at 25 mph in the manufacturer's recommended gear with road load;

(c) A room air change of 90 times per hour is not required;

(d) The windshield wipers may be used during the test if they are operated without manual assist;

(e) One or two windows may be open a total of one inch;

(f) The defroster blower may be turned on at any time; and

(g) The wind velocity is at any level from 0 to 2 mph.

(h) The test chamber temperature and the wind velocity shall be measured, after the engine has been started, at the forwardmost point of the vehicle or a point 36 inches from the base of the windshield, whichever is farther forward, at a level halfway between the top and bottom of the windshield on the vehicle centerline.

33 F.R. 6469
April 27, 1968

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 104**Windshield Wiping and Washing Systems—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses****(Docket No. 7)**

Motor Vehicle Safety Standard No. 104 (32 F.R. 2410) specifies requirements for windshield wiping and washing systems for passenger cars 68 or more inches in overall width. A proposal to amend section 371.21 of Part 371, Federal Motor Vehicle Safety Standards, by amending Standard No. 104 was published in the *Federal Register* on December 28, 1967 (32 F.R. 20867).

Interested persons have been afforded an opportunity to participate in the making of the amendment. Their comments, as well as other available information, have been carefully considered.

The primary purpose of the amendment is to broaden the application of the Initial Standard to cover smaller passenger cars, multipurpose passenger vehicles, trucks, and buses. The wiped-area performance requirements have been extended to cars smaller than 68 inches wide, and tables which prescribe the minimum size of wiped areas have been added for such cars. The overall effect is that the wiper systems of various passenger cars must wipe areas to provide approximately equivalent driver vision. The wiper frequency requirement, modified to prescribe that the highest and lowest frequencies must differ by at least 15 cycles per minute, has been extended to multipurpose passenger vehicles, trucks, and buses. A requirement for a windshield washing system has also been extended to smaller cars, multipurpose passenger vehicles, trucks, and buses. Other modifications to the standard were made in order to improve its clarity.

The material received in response to the notice of proposed rulemaking evinced almost universal acknowledgement that broadening of the coverage of the standard would improve overall driver visibility and thus contribute to safety on the highways. With a few minor exceptions, dis-

cussed below, there was no suggestion that manufacturers would have any difficulty in complying with the revised requirements by the January 1, 1969, effective date.

Some of the comments indicated some misunderstanding of the reference to SAE Recommended Practice J903a, "Passenger Car Windshield Wiper Systems," May 1966, in paragraph S4.1.2 of the standard. Paragraph S4.1.2 is part of the wiped area requirement and it provides, among other things, for testing "in accordance with" SAE Recommended Practice J903a. This does not mean that all of section 4, "Test Methods," of SAE Recommended Practice J903a is incorporated by reference into the wiped area requirements of the standard. The reference to the SAE Recommended Practice relates only to its procedure for testing wiper systems for compliance with wiped area requirements. Therefore, the ozone test, wiper system stall test, 1,500,000-cycle durability test, and other details of section 4 of SAE Recommended Practice J903a are not included in the scope of Standard No. 104.

Several comments asked that the standard contain a demonstration procedure for testing windshield wiper systems for compliance with the 45-cycle-per-minute frequency requirement and the 15-cycle-per-minute frequency differential requirement. Apparently, these persons were concerned that the ability of systems to meet both requirements might be judged under abnormal conditions rather than under those encountered in normal driving. Considering these requests reasonable, the Administrator has provided that windshield wiper systems will be deemed to have met the frequency differential requirements of the standard (sections S4.1.2 and S4.1.3) if they meet those requirements when tested in accor-

dance with sections 4.1.1 and 4.1.2 of SAE Recommended Practice J903a.

One comment requested clarification of the location of the plan view reference line in the "eyellipse." The "eyellipse" is the "95 percent eye range contour" specified in SAE Recommended Practice J941, "Passenger Car Driver's Eye Range," November 1965. The author of this comment pointed out that Figure 2 in Recommended Practice J903a incorrectly shows the plan view reference line as located through the geometric center of the 95 percent eye range contour. The drawings referred to in Recommended Practice J941 show the "eyellipse" centerline as dissecting the left ellipse of the two intersecting ellipses in the plan view. In paragraph S3 of the standard, the definition of the "95 percent eye range contour" makes reference to SAE Recommended Practice J941, which correctly positions the plan view reference line in the left-hand ellipse of the "eyellipse." Accordingly, the Administrator has determined that subparagraph (a) of the definition of "plan view reference line" in paragraph S3 of the standard correctly reflects this position as defined, but subparagraph (b) of the same definition has been modified to clarify the location of the "eyellipse." Subparagraph (b), as revised by this amendment, places the plan view reference line outboard of the longitudinal centerline of the driver's designated seating position, thus locating the "eyellipse" itself geometrically in the center of the seat.

In the notice of proposed rulemaking, paragraph S4.2 required a windshield washing system meeting the requirements of SAE Recommended Practice J942, "Passenger Car Windshield Washer Systems," November 1965. Section 3.1 of that Recommended Practice sets washer system capability requirements by reference to the passenger car wiped area requirements of SAE Recommended Practice J903. Several comments pointed this out and requested modification of the standard in view of the fact that the wiped area requirements of the standard are different from those of Recommended Practice J903. In addition, some comments sought revision of this particular provision on the ground that the wiped areas of Recommended Practice J903 were created for passenger cars, while the washer provisions

of the standard apply to multipurpose passenger vehicles, trucks, and buses as well. In view of these comments, the Administrator has deleted the cross-reference, and S4.2 of the standard has been modified. The passenger car wiped-area requirement is now defined as that established under paragraph S4.1.2.1 of the standard; the wiped area for multipurpose passenger vehicles, trucks, and buses is now defined as the wiped area pattern designed by the manufacturer for the windshield wiping system on the exterior of the windshield glazing.

One comment sought a change in the wiper frequency differential requirement from 15 cycles per minute to 10 cycles per minute, claiming that production tolerances did not permit exact compliance with the 15-cycle-per-minute differential requirement. The comment did not indicate why, assuming a 5-cycle-per-minute tolerance is needed, the system could not be constructed to operate in the frequency differential range of between 15 and 20 cycles per minute rather than a 10-15 cycle range. The standard, like all standards, is a minimum one, and nothing in it prohibits a higher standard of performance than the one specified as minimal. For these reasons, and because the deviation requested would, if granted, lower the safety performance of this segment of the standard, the request has been denied.

Similarly, the Administrator has denied a request for deletion of the requirement that windshield washing systems must, when tested, deliver approximately 15 cc. of fluid to the windshield glazing surface. The requirement is embodied in section 2.11 of SAE Recommended Practice J942, which is incorporated by reference in paragraph 4.2 of the standard. The amount of fluid placed on the windshield's exterior is a central performance characteristic of a washing system, and a decrease in the required amount would clearly diminish the capability of the system to promote safety. Neither the comments in general nor any other known data indicate that the requirement incorporated in the standard is unfeasible. The one comment that sought a change in this aspect of the standard contained no detail demonstrating that systems in current production would be unable to meet the requirement by the effective date of the amendment. Consequently, the Administrator has decided not to deviate

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 104**Windshield Wiping and Washing Systems—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses****(Docket No. 7)**

Motor Vehicle Safety Standard No. 104 (32 F.R. 2410) specifies requirements for windshield wiping and washing systems for passenger cars 68 or more inches in overall width. A proposal to amend section 371.21 of Part 371, Federal Motor Vehicle Safety Standards, by amending Standard No. 104 was published in the *Federal Register* on December 28, 1967 (32 F.R. 20867).

Interested persons have been afforded an opportunity to participate in the making of the amendment. Their comments, as well as other available information, have been carefully considered.

The primary purpose of the amendment is to broaden the application of the Initial Standard to cover smaller passenger cars, multipurpose passenger vehicles, trucks, and buses. The wiped-area performance requirements have been extended to cars smaller than 68 inches wide, and tables which prescribe the minimum size of wiped areas have been added for such cars. The overall effect is that the wiper systems of various passenger cars must wipe areas to provide approximately equivalent driver vision. The wiper frequency requirement, modified to prescribe that the highest and lowest frequencies must differ by at least 15 cycles per minute, has been extended to multipurpose passenger vehicles, trucks, and buses. A requirement for a windshield washing system has also been extended to smaller cars, multipurpose passenger vehicles, trucks, and buses. Other modifications to the standard were made in order to improve its clarity.

The material received in response to the notice of proposed rulemaking evinced almost universal acknowledgement that broadening of the coverage of the standard would improve overall driver visibility and thus contribute to safety on the highways. With a few minor exceptions, dis-

cussed below, there was no suggestion that manufacturers would have any difficulty in complying with the revised requirements by the January 1, 1969, effective date.

Some of the comments indicated some misunderstanding of the reference to SAE Recommended Practice J903a, "Passenger Car Windshield Wiper Systems," May 1966, in paragraph S4.1.2 of the standard. Paragraph S4.1.2 is part of the wiped area requirement and it provides, among other things, for testing "in accordance with" SAE Recommended Practice J903a. This does not mean that all of section 4, "Test Methods," of SAE Recommended Practice J903a is incorporated by reference into the wiped area requirements of the standard. The reference to the SAE Recommended Practice relates only to its procedure for testing wiper systems for compliance with wiped area requirements. Therefore, the ozone test, wiper system stall test, 1,500,000-cycle durability test, and other details of section 4 of SAE Recommended Practice J903a are not included in the scope of Standard No. 104.

Several comments asked that the standard contain a demonstration procedure for testing windshield wiper systems for compliance with the 45-cycle-per-minute frequency requirement and the 15-cycle-per-minute frequency differential requirement. Apparently, these persons were concerned that the ability of systems to meet both requirements might be judged under abnormal conditions rather than under those encountered in normal driving. Considering these requests reasonable, the Administrator has provided that windshield wiper systems will be deemed to have met the frequency differential requirements of the standard (sections S4.1.2 and S4.1.1.3) if they meet those requirements when tested in accor-

dance with sections 4.1.1 and 4.1.2 of SAE Recommended Practice J903a.

One comment requested clarification of the location of the plan view reference line in the "eyellipse." The "eyellipse" is the "95 percent eye range contour" specified in SAE Recommended Practice J941, "Passenger Car Driver's Eye Range," November 1965. The author of this comment pointed out that Figure 2 in Recommended Practice J903a incorrectly shows the plan view reference line as located through the geometric center of the 95 percent eye range contour. The drawings referred to in Recommended Practice J941 show the "eyellipse" centerline as dissecting the left ellipse of the two intersecting ellipses in the plan view. In paragraph S3 of the standard, the definition of the "95 percent eye range contour" makes reference to SAE Recommended Practice J941, which correctly positions the plan view reference line in the left-hand ellipse of the "eyellipse." Accordingly, the Administrator has determined that subparagraph (a) of the definition of "plan view reference line" in paragraph S3 of the standard correctly reflects this position as defined, but subparagraph (b) of the same definition has been modified to clarify the location of the "eyellipse." Subparagraph (b), as revised by this amendment, places the plan view reference line outboard of the longitudinal centerline of the driver's designated seating position, thus locating the "eyellipse" itself geometrically in the center of the seat.

In the notice of proposed rulemaking, paragraph S4.2 required a windshield washing system meeting the requirements of SAE Recommended Practice J942, "Passenger Car Windshield Washer Systems," November 1965. Section 3.1 of that Recommended Practice sets washer system capability requirements by reference to the passenger car wiped area requirements of SAE Recommended Practice J903. Several comments pointed this out and requested modification of the standard in view of the fact that the wiped area requirements of the standard are different from those of Recommended Practice J903. In addition, some comments sought revision of this particular provision on the ground that the wiped areas of Recommended Practice J903 were created for passenger cars, while the washer provisions

of the standard apply to multipurpose passenger vehicles, trucks, and buses as well. In view of these comments, the Administrator has deleted the cross-reference, and S4.2 of the standard has been modified. The passenger car wiped-area requirement is now defined as that established under paragraph S4.1.2.1 of the standard; the wiped area for multipurpose passenger vehicles, trucks, and buses is now defined as the wiped area pattern designed by the manufacturer for the windshield wiping system on the exterior of the windshield glazing.

One comment sought a change in the wiper frequency differential requirement from 15 cycles per minute to 10 cycles per minute, claiming that production tolerances did not permit exact compliance with the 15-cycle-per-minute differential requirement. The comment did not indicate why, assuming a 5-cycle-per-minute tolerance is needed, the system could not be constructed to operate in the frequency differential range of between 15 and 20 cycles per minute rather than a 10-15 cycle range. The standard, like all standards, is a minimum one, and nothing in it prohibits a higher standard of performance than the one specified as minimal. For these reasons, and because the deviation requested would, if granted, lower the safety performance of this segment of the standard, the request has been denied.

Similarly, the Administrator has denied a request for deletion of the requirement that windshield washing systems must, when tested, deliver approximately 15 cc. of fluid to the windshield glazing surface. The requirement is embodied in section 2.11 of SAE Recommended Practice J942, which is incorporated by reference in paragraph 4.2 of the standard. The amount of fluid placed on the windshield's exterior is a central performance characteristic of a washing system, and a decrease in the required amount would clearly diminish the capability of the system to promote safety. Neither the comments in general nor any other known data indicate that the requirement incorporated in the standard is unfeasible. The one comment that sought a change in this aspect of the standard contained no detail demonstrating that systems in current production would be unable to meet the requirement by the effective date of the amendment. Consequently, the Administrator has decided not to deviate

from the adoption of section 2.11 of Recommended Practice J942, as announced in the notice of proposed rulemaking.

Several comments pointed out the difficulties involved in prescribing wiped-area requirements for multipurpose passenger vehicles, trucks, and buses. The Administrator is cognizant of the problems that arise because of the wide variety of windshield sizes and configurations as well as the differing relationships between the drivers' positions and the windshields in these vehicles. Owing to these factors, he has concluded that it is not possible to prescribe uniform wiped areas for the wiper systems of these vehicles generally or for vehicles within any generic type at this time. Hence, the standard's minimum wiped-area requirements apply only to passenger cars. The possibility of prescribing such requirements for other vehicular types will continue to be studied.

In addition, the Administration will also study the question of whether there should be standards applicable to so-called "hidden" windshield wipers

to insure their operability under snow and ice conditions. Although a number of comments sought the inclusion of such a provision in this standard, it was deemed inadvisable to do so in view of the absence of any such provision from the notice of proposed rulemaking.

In consideration of the foregoing, § 371.21 of Part 371, Federal Motor Vehicle Safety Standards, is amended effective January 1, 1969, by amending Motor Vehicle Safety Standard No. 104

This amendment is made under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority of April 24, 1968.

Issued in Washington, D.C., on April 24, 1968.

Lowell K. Bridwell
Federal Highway Administrator.

33 F.R. 6466
April 27, 1968

from the adoption of section 2.11 of Recommended Practice J942, as announced in the notice of proposed rulemaking.

Several comments pointed out the difficulties involved in prescribing wiped-area requirements for multipurpose passenger vehicles, trucks, and buses. The Administrator is cognizant of the problems that arise because of the wide variety of windshield sizes and configurations as well as the differing relationships between the drivers' positions and the windshields in these vehicles. Owing to these factors, he has concluded that it is not possible to prescribe uniform wiped areas for the wiper systems of these vehicles generally or for vehicles within any generic type at this time. Hence, the standard's minimum wiped-area requirements apply only to passenger cars. The possibility of prescribing such requirements for other vehicular types will continue to be studied.

In addition, the Administration will also study the question of whether there should be standards applicable to so-called "hidden" windshield wipers

to insure their operability under snow and ice conditions. Although a number of comments sought the inclusion of such a provision in this standard, it was deemed inadvisable to do so in view of the absence of any such provision from the notice of proposed rulemaking.

In consideration of the foregoing, § 371.21 of Part 371, Federal Motor Vehicle Safety Standards, is amended effective January 1, 1969, by amending Motor Vehicle Safety Standard No. 104

This amendment is made under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority of April 24, 1968.

Issued in Washington, D.C., on April 24, 1968.

Lowell K. Bridwell
Federal Highway Administrator.

33 F.R. 6466
April 27, 1968

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 104**Windshield Wiping and Washing Systems—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses****(Docket No. 7)**

An amendment to Motor Vehicle Standard No. 104, which specifies requirements for windshield wiping and washing systems in passenger cars, multipurpose passenger vehicles, trucks, and buses, was issued on April 24, 1968 (33 F.R. 6466). The amendment is effective January 1, 1969.

Paragraph S3 of the amended standard, entitled "Definitions," contains a definition of the "plan view reference line" which, as it applies to vehicles with individual-type seats, locates the line parallel to the vehicle's longitudinal centerline so that the 95 percent eye range contour, or eyellipse, is geometrically positioned around the longitudinal centerline of the driver's designated seating position.

The purpose of the definition, as stated in the preamble to the standard, was to position the eyellipse geometrically in the center of the seat. The Administrator has determined that the definition may be construed to permit a different location of the eyellipse, since it provides that the 95 percent eye range contour must be geometrically positioned "around" the longitudinal centerline of the driver's seat. Therefore, the definition is being amended to clarify the location of the eyellipse by requiring its geometric center to be positioned on the longitudinal centerline of the driver's designated seating position.

Several petitions for reconsideration of the amendment have raised the possibility that the definition of plan view reference line may impose an unintended hardship on manufacturers of smaller cars. The effect of the definition is to relocate the eyellipse slightly outboard of the location prescribed in the standard prior to the amendment. This change may make it impracticable for manufacturers of smaller cars to com-

ply with the wiped-area requirements of the standard. Therefore, the definition is being further amended to permit optional positioning of the eyellipse on the plan view reference line in the manner prescribed in the standard prior to the previous amendment.

Neither of these revisions appreciably alters the amount of the windshield surface which wiping systems must wipe under the standard. Hence the amendments will have no adverse effect on motor vehicle safety.

Paragraph S4.1.1.3 of the amendment provides, in part, that the lowest frequency or speed of windshield wiping systems must be at least 20 cycles per minute regardless of engine speed and engine load. The Administrator has received petitions asking that a frequency or speed lower than 20 cycles per minute be allowed. The petitioners state that such a lower frequency or speed will be useful under conditions of very light precipitation or wheel spray, and that retention of the 20-cycle-per-minute minimum will preclude the use of so-called "intermittent" windshield wiping systems. The Administrator has concluded that the standard should be amended to allow manufacturers to use systems which can operate at a frequency or speed of less than 20 cycles per minute so long as the driver of the vehicle has available a system capable of operating at at least two other frequencies or speeds, differing by at least 15 cycles per minute, the lower of which is at least 20 cycles per minute. The net effect of this change is to allow as many different frequencies or speeds as the manufacturer desires as long as at least two of these speeds or frequencies meet the specified requirements.

Effective: January 1, 1969

Since these amendments provide clarification, relieve a hardship and impose no additional burden on any person, notice and public procedure thereon are unnecessary.

In consideration of the foregoing, § 371.21 of Part 371, Federal Motor Vehicle Safety Standards, Motor Vehicle Safety Standard No. 104 (32 F.R. 2410), as amended (33 F.R. 6466), is amended, effective July 31, 1968. . . .

It is found, for good cause shown, that an effective date sooner than 180 days after the issuance of these amendments is in the public interest.

(Secs. 103, 119, National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1470); delegation of authority of April 24, 1968 (33 F.R. 6538)).

Issued in Washington, D.C., on July 31, 1968.

Lowell K. Bridwell,
Federal Highway Administrator.

33 F.R. 11117
August 6, 1968

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 104**Windshield Wiping and Washing Systems—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses****(Docket No. 7)**

An amendment to Motor Vehicle Standard No. 104, which specifies requirements for windshield wiping and washing systems in passenger cars, multipurpose passenger vehicles, trucks, and buses, was issued on April 24, 1968 (33 F.R. 6466). The amendment is effective January 1, 1969.

Paragraph S3 of the amended standard, entitled "Definitions," contains a definition of the "plan view reference line" which, as it applies to vehicles with individual-type seats, locates the line parallel to the vehicle's longitudinal centerline so that the 95 percent eye range contour, or eyellipse, is geometrically positioned around the longitudinal centerline of the driver's designated seating position.

The purpose of the definition, as stated in the preamble to the standard, was to position the eyellipse geometrically in the center of the seat. The Administrator has determined that the definition may be construed to permit a different location of the eyellipse, since it provides that the 95 percent eye range contour must be geometrically positioned "around" the longitudinal centerline of the driver's seat. Therefore, the definition is being amended to clarify the location of the eyellipse by requiring its geometric center to be positioned on the longitudinal centerline of the driver's designated seating position.

Several petitions for reconsideration of the amendment have raised the possibility that the definition of plan view reference line may impose an unintended hardship on manufacturers of smaller cars. The effect of the definition is to relocate the eyellipse slightly outboard of the location prescribed in the standard prior to the amendment. This change may make it impracticable for manufacturers of smaller cars to com-

ply with the wiped-area requirements of the standard. Therefore, the definition is being further amended to permit optional positioning of the eyellipse on the plan view reference line in the manner prescribed in the standard prior to the previous amendment.

Neither of these revisions appreciably alters the amount of the windshield surface which wiping systems must wipe under the standard. Hence the amendments will have no adverse effect on motor vehicle safety.

Paragraph S4.1.1.3 of the amendment provides, in part, that the lowest frequency or speed of windshield wiping systems must be at least 20 cycles per minute regardless of engine speed and engine load. The Administrator has received petitions asking that a frequency or speed lower than 20 cycles per minute be allowed. The petitioners state that such a lower frequency or speed will be useful under conditions of very light precipitation or wheel spray, and that retention of the 20-cycle-per-minute minimum will preclude the use of so-called "intermittent" windshield wiping systems. The Administrator has concluded that the standard should be amended to allow manufacturers to use systems which can operate at a frequency or speed of less than 20 cycles per minute so long as the driver of the vehicle has available a system capable of operating at at least two other frequencies or speeds, differing by at least 15 cycles per minute, the lower of which is at least 20 cycles per minute. The net effect of this change is to allow as many different frequencies or speeds as the manufacturer desires as long as at least two of these speeds or frequencies meet the specified requirements.

Effective: January 1, 1969

Since these amendments provide clarification, relieve a hardship and impose no additional burden on any person, notice and public procedure thereon are unnecessary.

In consideration of the foregoing, § 371.21 of Part 371, Federal Motor Vehicle Safety Standards, Motor Vehicle Safety Standard No. 104 (32 F.R. 2410), as amended (33 F.R. 6466), is amended, effective July 31, 1968. . . .

It is found, for good cause shown, that an effective date sooner than 180 days after the issuance of these amendments is in the public interest.

(Secs. 103, 119, National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1470); delegation of authority of April 24, 1968 (33 F.R. 6538)).

Issued in Washington, D.C., on July 31, 1968.

Lowell K. Bridwell,
Federal Highway Administrator.

33 F.R. 11117
August 6, 1968

MOTOR VEHICLE SAFETY STANDARD NO. 104

Windshield Wiping and Washing Systems—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses

S1. Scope. This standard specifies requirements for windshield wiping and washing systems.

S2. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S3. Definitions. The term "seating reference point" is substituted for the terms "manikin H point" and "H point" wherever either of those terms appears in any SAE Standard or SAE Recommended Practice referred to in this standard.

"Daylight opening" means the maximum unobstructed opening through the glazing surface, as defined in paragraph 2.3.12 of section E, Ground Vehicle Practice, SAE Aerospace-Automotive Drawing Standards, September 1963.

"Glazing surface reference line" means the line resulting from the intersection of the glazing surface and a horizontal plane 25 inches above the seating reference point, as shown in Figure 1 of SAE Recommended Practice J903a, "Passenger Car Windshield Wiper Systems," May 1966.

"Overall width" means the maximum overall body width dimension "W116," as defined in section E, Ground Vehicle Practice, SAE Aerospace-Automotive Drawing Standards, September 1963.

"Plan view reference line" means—

(a) For vehicles with bench-type seats, a line parallel to the vehicle longitudinal centerline outboard of the steering wheel centerline 0.15 times the difference between one-half of the shoulder room dimension and the steering wheel centerline-to-car-centerline dimension as shown in Figure 2 of SAE Recommended Practice J903a, May 1966; or

(b) For vehicles with individual-type seats, either—

(i) A line parallel to the vehicle longitudinal centerline which passes through the center of the driver's designated seating position; or

(ii) A line parallel to the vehicle longitudinal centerline located so that the geometric center of the 95 percent eye range contour is positioned on the longitudinal centerline of the driver's designated seating position.

"Shoulder room dimension" means the front shoulder room dimension "W3" as defined in section E, Ground Vehicle Practice, SAE Aerospace-Automotive Drawing Standards, September 1963.

"95% eye range contour" means the 95th percentile tangential cutoff specified in SAE Recommended Practice J941, "Passenger Car Driver's Eye Range," November 1965.

S4. Requirements.

S4.1 Windshield wiping system. Each vehicle shall have a power-driven windshield wiping system that meets the requirements of S4.1.1.

S4.1.1 Frequency.

S4.1.1.1 Each windshield wiping system shall have at least two frequencies or speeds.

S4.1.1.2 One frequency or speed shall be at least 45 cycles per minute regardless of engine load and engine speed.

S4.1.1.3 Regardless of engine speed and engine load, the highest and one lower frequency or speed shall differ by at least 15 cycles per minute. Such lower frequency or speed shall be at least 20 cycles per minute regardless of engine speed and engine load.

TABLE I. Passenger cars of less than 60 inches in overall width.

| COLUMN 1 | COLUMN 2 | COLUMN 3 | COLUMN 4 | COLUMN 5 | COLUMN 6 |
|----------|-----------------------------|-------------------|----------|----------|----------|
| AREA | MINIMUM PERCENT TO BE WIPED | ANGLES IN DEGREES | | | |
| | | LEFT | RIGHT | UP | DOWN |
| A | 80 | 16 | 49 | 7 | 5 |
| B | 94 | 13 | 46 | 4 | 3 |
| C | 99 | 7 | 15 | 3 | 1 |

TABLE II. Passenger cars of 60 or more but less than 64 inches in overall width.

| COLUMN 1 | COLUMN 2 | COLUMN 3 | COLUMN 4 | COLUMN 5 | COLUMN 6 |
|----------|-----------------------------|-------------------|----------|----------|----------|
| AREA | MINIMUM PERCENT TO BE WIPED | ANGLES IN DEGREES | | | |
| | | LEFT | RIGHT | UP | DOWN |
| A | 80 | 17 | 51 | 8 | 5 |
| B | 94 | 13 | 49 | 4 | 3 |
| C | 99 | 7 | 15 | 3 | 1 |

TABLE III. Passenger cars of 64 or more but less than 68 inches in overall width.

| COLUMN 1 | COLUMN 2 | COLUMN 3 | COLUMN 4 | COLUMN 5 | COLUMN 6 |
|----------|-----------------------------|-------------------|----------|----------|----------|
| AREA | MINIMUM PERCENT TO BE WIPED | ANGLES IN DEGREES | | | |
| | | LEFT | RIGHT | UP | DOWN |
| A | 80 | 17 | 53 | 9 | 5 |
| B | 94 | 14 | 51 | 5 | 3 |
| C | 99 | 8 | 15 | 4 | 1 |

TABLE IV. Passenger cars of 68 or more inches in overall width.

| COLUMN 1 | COLUMN 2 | COLUMN 3 | COLUMN 4 | COLUMN 5 | COLUMN 6 |
|----------|-----------------------------|-------------------|----------|----------|----------|
| AREA | MINIMUM PERCENT TO BE WIPED | ANGLES IN DEGREES | | | |
| | | LEFT | RIGHT | UP | DOWN |
| A | 80 | 18 | 56 | 10 | 5 |
| B | 94 | 14 | 53 | 5 | 3 |
| C | 99 | 10 | 15 | 5 | 1 |

S4.1.1.4 Compliance with subparagraphs S4.1.1.2 and S4.1.1.3 may be demonstrated by testing under the conditions specified in sections 4.1.1 and 4.1.2 of SAE Recommended Practice J903a, May 1966.

S4.1.2 Wiped area. When tested wet in accordance with SAE Recommended Practice J903a, May 1966, each passenger car windshield wiping system shall wipe the percentage of Areas A, B, and C of the windshield (established in accordance with S4.1.2.1) that (1) is specified in column 2 of the applicable table following subparagraph S4.1.2.1; and (2) is within the area bounded by a perimeter line on the glazing surface one inch from the edge of the daylight opening.

S4.1.2.1 Areas A, B, and C shall be established as shown in Figures 1 and 2 of SAE Recommended Practice J903a, May 1966, using the angles specified in Columns 3 through 6 of Table I, II, III or IV, as applicable.

S4.2 Windshield washing system.

S4.2.1 Each passenger car shall have a windshield washing system that meets the requirements of SAE Recommended Practice J942, "Passenger Car Windshield Washer Systems" November 1965, except that the reference to "the effective wipe pattern defined in SAE J903, paragraph 3.1.2" in paragraph 3.1 of SAE Recommended Practice J942 shall be deleted and "the areas established in accordance with subparagraph S4.1.2.1 of Motor Vehicle Safety Standard No. 104" shall be inserted in lieu thereof.

S4.2.2 Each multipurpose passenger vehicle, truck and bus shall have a windshield washing system that meets the requirements of SAE Recommended Practice J942, November 1965, except that the reference to "the effective wipe pattern defined in SAE J903, paragraph 3.1.2" in paragraph 3.1 of SAE Recommended Practice J942 shall be deleted and "the pattern design by the manufacturer for the windshield wiping system on the exterior surface of the windshield glazing" shall be inserted in lieu thereof.

33 F.R. 6467
April 27, 1968

MOTOR VEHICLE SAFETY STANDARD NO. 104

Windshield Wiping and Washing Systems—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses

S1. Scope. This standard specifies requirements for windshield wiping and washing systems.

S2. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S3. Definitions. The term "seating reference point" is substituted for the terms "manikin H point" and "H point" wherever either of those terms appears in any SAE Standard or SAE Recommended Practice referred to in this standard.

"Daylight opening" means the maximum unobstructed opening through the glazing surface, as defined in paragraph 2.3.12 of section E, Ground Vehicle Practice, SAE Aerospace-Automotive Drawing Standards, September 1963.

"Glazing surface reference line" means the line resulting from the intersection of the glazing surface and a horizontal plane 25 inches above the seating reference point, as shown in Figure 1 of SAE Recommended Practice J903a, "Passenger Car Windshield Wiper Systems," May 1966.

"Overall width" means the maximum overall body width dimension "W116," as defined in section E, Ground Vehicle Practice, SAE Aerospace-Automotive Drawing Standards, September 1963.

"Plan view reference line" means—

(a) For vehicles with bench-type seats, a line parallel to the vehicle longitudinal centerline outboard of the steering wheel centerline 0.15 times the difference between one-half of the shoulder room dimension and the steering wheel centerline-to-car-centerline dimension as shown in Figure 2 of SAE Recommended Practice J903a, May 1966; or

(b) For vehicles with individual-type seats, either—

(i) A line parallel to the vehicle longitudinal centerline which passes through the center of the driver's designated seating position; or

(ii) A line parallel to the vehicle longitudinal centerline located so that the geometric center of the 95 percent eye range contour is positioned on the longitudinal centerline of the driver's designated seating position.

"Shoulder room dimension" means the front shoulder room dimension "W3" as defined in section E, Ground Vehicle Practice, SAE Aerospace-Automotive Drawing Standards, September 1963.

"95% eye range contour" means the 95th percentile tangential cutoff specified in SAE Recommended Practice J941, "Passenger Car Driver's Eye Range," November 1965.

S4. Requirements.

S4.1 Windshield wiping system. Each vehicle shall have a power-driven windshield wiping system that meets the requirements of S4.1.1.

S4.1.1 Frequency.

S4.1.1.1 Each windshield wiping system shall have at least two frequencies or speeds.

S4.1.1.2 One frequency or speed shall be at least 45 cycles per minute regardless of engine load and engine speed.

S4.1.1.3 Regardless of engine speed and engine load, the highest and one lower frequency or speed shall differ by at least 15 cycles per minute. Such lower frequency or speed shall be at least 20 cycles per minute regardless of engine speed and engine load.

TABLE I. Passenger cars of less than 60 inches in overall width.

| COLUMN 1 | COLUMN 2 | COLUMN 3 | COLUMN 4 | COLUMN 5 | COLUMN 6 |
|----------|--------------------------------------|-------------------|----------|----------|----------|
| AREA | MINIMUM PERCENT TO BE WIPED | ANGLES IN DEGREES | | | |
| | | LEFT | RIGHT | UP | DOWN |
| A | 80 | 16 | 49 | 7 | 5 |
| B | 94 | 13 | 46 | 4 | 3 |
| C | 99 | 7 | 15 | 3 | 1 |

TABLE II. Passenger cars of 60 or more but less than 64 inches in overall width.

| COLUMN 1 | COLUMN 2 | COLUMN 3 | COLUMN 4 | COLUMN 5 | COLUMN 6 |
|----------|--------------------------------------|-------------------|----------|----------|----------|
| AREA | MINIMUM PERCENT TO BE WIPED | ANGLES IN DEGREES | | | |
| | | LEFT | RIGHT | UP | DOWN |
| A | 80 | 17 | 51 | 8 | 5 |
| B | 94 | 13 | 49 | 4 | 3 |
| C | 99 | 7 | 15 | 3 | 1 |

TABLE III. Passenger cars of 64 or more but less than 68 inches in overall width.

| COLUMN 1 | COLUMN 2 | COLUMN 3 | COLUMN 4 | COLUMN 5 | COLUMN 6 |
|----------|--------------------------------------|-------------------|----------|----------|----------|
| AREA | MINIMUM PERCENT TO BE WIPED | ANGLES IN DEGREES | | | |
| | | LEFT | RIGHT | UP | DOWN |
| A | 80 | 17 | 53 | 9 | 5 |
| B | 94 | 14 | 51 | 5 | 3 |
| C | 99 | 8 | 15 | 4 | 1 |

TABLE IV. Passenger cars of 68 or more inches in overall width.

| COLUMN 1 | COLUMN 2 | COLUMN 3 | COLUMN 4 | COLUMN 5 | COLUMN 6 |
|----------|--------------------------------------|-------------------|----------|----------|----------|
| AREA | MINIMUM PERCENT TO BE WIPED | ANGLES IN DEGREES | | | |
| | | LEFT | RIGHT | UP | DOWN |
| A | 80 | 18 | 56 | 10 | 5 |
| B | 94 | 14 | 53 | 5 | 3 |
| C | 99 | 10 | 15 | 5 | 1 |

S4.1.1.4 Compliance with subparagraphs S4.1.1.2 and S4.1.1.3 may be demonstrated by testing under the conditions specified in sections 4.1.1 and 4.1.2 of SAE Recommended Practice J903a, May 1966.

S4.1.2 Wiped area. When tested wet in accordance with SAE Recommended Practice J903a, May 1966, each passenger car windshield wiping system shall wipe the percentage of Areas A, B, and C of the windshield (established in accordance with S4.1.2.1) that (1) is specified in column 2 of the applicable table following subparagraph S4.1.2.1; and (2) is within the area bounded by a perimeter line on the glazing surface one inch from the edge of the daylight opening.

S4.1.2.1 Areas A, B, and C shall be established as shown in Figures 1 and 2 of SAE Recommended Practice J903a, May 1966, using the angles specified in Columns 3 through 6 of Table I, II, III or IV, as applicable.

S4.2 Windshield washing system.

S4.2.1 Each passenger car shall have a windshield washing system that meets the requirements of SAE Recommended Practice J942, "Passenger Car Windshield Washer Systems" November 1965, except that the reference to "the effective wipe pattern defined in SAE J903, paragraph 3.1.2" in paragraph 3.1 of SAE Recommended Practice J942 shall be deleted and "the areas established in accordance with subparagraph S4.1.2.1 of Motor Vehicle Safety Standard No. 104" shall be inserted in lieu thereof.

S4.2.2 Each multipurpose passenger vehicle, truck and bus shall have a windshield washing system that meets the requirements of SAE Recommended Practice J942, November 1965, except that the reference to "the effective wipe pattern defined in SAE J903, paragraph 3.1.2" in paragraph 3.1 of SAE Recommended Practice J942 shall be deleted and "the pattern design by the manufacturer for the windshield wiping system on the exterior surface of the windshield glazing" shall be inserted in lieu thereof.

33 F.R. 6467
April 27, 1968

PREAMBLE TO MOTOR VEHICLE SAFETY STANDARD NO. 105a

Hydraulic Brake Systems

(Docket No. 70-27; Notice 5)

This notice amends Part 571 of Title 49, Code of Federal Regulations, to add a new Motor Vehicle Safety Standard No. 105a (49 CFR § 571.105a) that establishes requirements for motor vehicle hydraulic brake systems and parking brake systems. A notice of proposed rule-making on this subject was published on November 11, 1970 (35 F.R. 17345).

Federal Standard No. 105, in effect since January 1, 1968, represents the initial Federal effort to specify braking requirements for motor vehicles. The standard requires that passenger cars be equipped with a split service brake system, and have stopping ability based upon deceleration rates specified in an SAE Recommended Practice. Requirements for fade and recovery, water recovery, and stability while braking are also included in the standard. These requirements do not, however, represent the full capabilities of modern braking technology. Braking continues to be the most important single element of accident avoidance from the standpoint of vehicle performance. The full utilization of the industry's technological capability in this area, within the limits of reasonable cost, is therefore of highest importance to the safety effort.

The requirements of this standard are specified in terms of performance on a surface of relatively high skid number. The NHTSA recognizes the importance to safety of good braking performance on surfaces such as wet or icy roads. It is monitoring closely the development work in progress on methods, such as antilock systems, designed to enhance vehicle performance over a wide variety of surfaces, in preparation for future rulemaking action adding performance requirements in this area. Until such requirements are made effective, this agency assumes that

manufacturers will design their vehicles for safe braking performance on all types of road surfaces, while continuing to work on, and make provision for, more advanced braking systems.

The notice issued in November 1970 proposed extension of applicability of Standard No. 105 to other vehicle types and covered the same factors deemed important in the earlier standard. These include stopping distance, linear stability while stopping, fade resistance, and fade recovery. The notice also proposed features in hydraulic braking systems that could warn against malfunction, and stop the vehicle should a malfunction appear in the normal service system. The amended standard covers each of these aspects as discussed below.

1. *Applicability.* Standard No. 105 applies to passenger cars, and has been extended to specify requirements for the first time for multipurpose passenger vehicles, trucks, and buses equipped with hydraulic brake systems. A definition of brake power unit has been adopted and appropriate modifications made in the text to clarify that vehicles with central hydraulic power systems were included in the Notice. Standard No. 105a does not apply to vehicles equipped with "air over hydraulic" systems, which remain within the purview of Standard No. 121, *Air Brake Systems*.

2. *Effective date:* to meet the proposed effective date of October 1, 1972, equipment and performance requirements would have been substantially weaker than those that have been adopted and the NHTSA has determined that a later effective date is, overall, in the public interest. It is therefore set at September 1, 1974.

3. *Service brake system.* All vehicles with hydraulic brake systems are required to have a

split service brake system, with partial failure or "emergency" braking features. Effectiveness of the system is demonstrated by a series of road tests covering stopping distance, stability, and fade and recovery, water recovery, and spike stops.

A. Stopping distance. As the proposal noted, "perhaps the most important indication of brake performance is the distance in which a brake system can stop a vehicle from a given speed." Stopping distances were proposed from 30 mph, 60 mph, and 80 mph and maximum attainable vehicle speed, under various load and system conditions, based upon vehicle category or weight. These tests included stops with the vehicle at a lightly loaded weight, and stops under partial failure conditions. The following illustrate examples of the proposal and amendment. In addition to the stopping distances discussed below, stopping distances from 30 mph, 80 mph, and maximum attainable vehicle speed are also specified.

Passenger cars. It was proposed that passenger cars demonstrate the ability to stop in 185 feet from 60 mph under adverse loading conditions. The stopping distance adopted, 194 feet, is only slightly longer. According to Consumer Information data submitted by manufacturers of 1972 passenger cars, contemporary vehicles ranked 26th to 61st would be unable to meet this stopping distance requirement. This new requirement will result in a substantial upgrading of passenger car stopping ability. Currently under Standard No. 105, passenger cars must demonstrate the ability to stop in 646 feet from 60 mph under partial failure conditions. The new standard lowers this distance to 431 feet, an increase from the proposed 388 feet. The same stopping distance requirement must be met with an inoperative brake power assist or brake power unit.

Vehicles with GVWR of 10,000 pounds or less. Vehicles other than passenger cars with a gross vehicle weight rating of 10,000 pounds or less, must demonstrate the ability to stop from 60 mph in 216 feet under adverse loading conditions, and in 484 feet under partial failure conditions.

Vehicles with GVWR greater than 10,000 pounds. Vehicles in this category must demon-

strate an ability to stop from 60 mph in 245 feet under adverse loading conditions, and in 553 feet under partial failure conditions.

B. Stability of vehicle while stopping. As proposed, a vehicle will be required to stop (other than in spike stops) without any part of it leaving a 12-foot-wide lane. Wheel lockup is permitted at a speed below 10 mph and lockup of only one wheel not controlled by an antilock system is permissible at speeds in excess of 10 mph.

C. Fade and recovery. Brake fade characteristics are critical from the standpoint of retaining adequate stopping power despite the high temperatures created by prolonged or severe use. A vehicle will demonstrate fade and recovery capability in two tests, by making a number of fade stops from 60 mph if it is a vehicle with a GVWR of 10,000 pounds or less, or fade snubs from 40 mph to 20 mph, if it is a heavier vehicle. The latter represents a modification of the proposed snub speed range of 50 mph to 15 mph. The proposed maximum speed fade recovery test has not been adopted; the effectiveness test at maximum attainable vehicle speed should indicate whether a brake system will experience problems with fade.

D. Water recovery. Service brake systems must also demonstrate an acceptable recovery after exposure to water. The method of immersion has been modified on the basis of comments that the method proposed would necessitate use of a trough 880 feet long. Instead, the amendment specifies that the vehicle shall be driven for not less than 2 minutes at a speed of 5 mph, in any combination of forward and reverse directions, through a trough having a water depth of 6 inches. This change should clarify the test requirement as well as simplifying enforcement procedures.

E. Spike stops. The spike stop proposal has been adopted, with a revision to allow 6 check stops (instead of one), at least one of which meets the requirements of the specified distance and pedal force. This allowance recognizes variability of test drivers and vehicles.

4. Parking brake system. The parking brake system proposal has also been adopted. When the parking brakes are applied, with a force not exceeding 90 pounds for a hand-operated system

PREAMBLE TO MOTOR VEHICLE SAFETY STANDARD NO. 105a

Hydraulic Brake Systems

(Docket No. 70-27; Notice 5)

This notice amends Part 571 of Title 49, Code of Federal Regulations, to add a new Motor Vehicle Safety Standard No. 105a (49 CFR § 571.105a) that establishes requirements for motor vehicle hydraulic brake systems and parking brake systems. A notice of proposed rule-making on this subject was published on November 11, 1970 (35 F.R. 17345).

Federal Standard No. 105, in effect since January 1, 1968, represents the initial Federal effort to specify braking requirements for motor vehicles. The standard requires that passenger cars be equipped with a split service brake system, and have stopping ability based upon deceleration rates specified in an SAE Recommended Practice. Requirements for fade and recovery, water recovery, and stability while braking are also included in the standard. These requirements do not, however, represent the full capabilities of modern braking technology. Braking continues to be the most important single element of accident avoidance from the standpoint of vehicle performance. The full utilization of the industry's technological capability in this area, within the limits of reasonable cost, is therefore of highest importance to the safety effort.

The requirements of this standard are specified in terms of performance on a surface of relatively high skid number. The NHTSA recognizes the importance to safety of good braking performance on surfaces such as wet or icy roads. It is monitoring closely the development work in progress on methods, such as antilock systems, designed to enhance vehicle performance over a wide variety of surfaces, in preparation for future rulemaking action adding performance requirements in this area. Until such requirements are made effective, this agency assumes that

manufacturers will design their vehicles for safe braking performance on all types of road surfaces, while continuing to work on, and make provision for, more advanced braking systems.

The notice issued in November 1970 proposed extension of applicability of Standard No. 105 to other vehicle types and covered the same factors deemed important in the earlier standard. These include stopping distance, linear stability while stopping, fade resistance, and fade recovery. The notice also proposed features in hydraulic braking systems that could warn against malfunction, and stop the vehicle should a malfunction appear in the normal service system. The amended standard covers each of these aspects as discussed below.

1. *Applicability.* Standard No. 105 applies to passenger cars, and has been extended to specify requirements for the first time for multipurpose passenger vehicles, trucks, and buses equipped with hydraulic brake systems. A definition of brake power unit has been adopted and appropriate modifications made in the text to clarify that vehicles with central hydraulic power systems were included in the Notice. Standard No. 105a does not apply to vehicles equipped with "air over hydraulic" systems, which remain within the purview of Standard No. 121, *Air Brake Systems*.

2. *Effective date:* to meet the proposed effective date of October 1, 1972, equipment and performance requirements would have been substantially weaker than those that have been adopted and the NHTSA has determined that a later effective date is, overall, in the public interest. It is therefore set at September 1, 1974.

3. *Service brake system.* All vehicles with hydraulic brake systems are required to have a

split service brake system, with partial failure or "emergency" braking features. Effectiveness of the system is demonstrated by a series of road tests covering stopping distance, stability, and fade and recovery, water recovery, and spike stops.

A. Stopping distance. As the proposal noted, "perhaps the most important indication of brake performance is the distance in which a brake system can stop a vehicle from a given speed." Stopping distances were proposed from 30 mph, 60 mph, and 80 mph and maximum attainable vehicle speed, under various load and system conditions, based upon vehicle category or weight. These tests included stops with the vehicle at a lightly loaded weight, and stops under partial failure conditions. The following illustrate examples of the proposal and amendment. In addition to the stopping distances discussed below, stopping distances from 30 mph, 80 mph, and maximum attainable vehicle speed are also specified.

Passenger cars. It was proposed that passenger cars demonstrate the ability to stop in 185 feet from 60 mph under adverse loading conditions. The stopping distance adopted, 194 feet, is only slightly longer. According to Consumer Information data submitted by manufacturers of 1972 passenger cars, contemporary vehicles ranked 26th to 61st would be unable to meet this stopping distance requirement. This new requirement will result in a substantial upgrading of passenger car stopping ability. Currently under Standard No. 105, passenger cars must demonstrate the ability to stop in 646 feet from 60 mph under partial failure conditions. The new standard lowers this distance to 431 feet, an increase from the proposed 388 feet. The same stopping distance requirement must be met with an inoperative brake power assist or brake power unit.

Vehicles with GVWR of 10,000 pounds or less. Vehicles other than passenger cars with a gross vehicle weight rating of 10,000 pounds or less, must demonstrate the ability to stop from 60 mph in 216 feet under adverse loading conditions, and in 484 feet under partial failure conditions.

Vehicles with GVWR greater than 10,000 pounds. Vehicles in this category must demon-

strate an ability to stop from 60 mph in 245 feet under adverse loading conditions, and in 553 feet under partial failure conditions.

B. Stability of vehicle while stopping. As proposed, a vehicle will be required to stop (other than in spike stops) without any part of it leaving a 12-foot-wide lane. Wheel lockup is permitted at a speed below 10 mph and lockup of only one wheel not controlled by an antilock system is permissible at speeds in excess of 10 mph.

C. Fade and recovery. Brake fade characteristics are critical from the standpoint of retaining adequate stopping power despite the high temperatures created by prolonged or severe use. A vehicle will demonstrate fade and recovery capability in two tests, by making a number of fade stops from 60 mph if it is a vehicle with a GVWR of 10,000 pounds or less, or fade snubs from 40 mph to 20 mph, if it is a heavier vehicle. The latter represents a modification of the proposed snub speed range of 50 mph to 15 mph. The proposed maximum speed fade recovery test has not been adopted; the effectiveness test at maximum attainable vehicle speed should indicate whether a brake system will experience problems with fade.

D. Water recovery. Service brake systems must also demonstrate an acceptable recovery after exposure to water. The method of immersion has been modified on the basis of comments that the method proposed would necessitate use of a trough 880 feet long. Instead, the amendment specifies that the vehicle shall be driven for not less than 2 minutes at a speed of 5 mph, in any combination of forward and reverse directions, through a trough having a water depth of 6 inches. This change should clarify the test requirement as well as simplifying enforcement procedures.

E. Spike stops. The spike stop proposal has been adopted, with a revision to allow 6 check stops (instead of one), at least one of which meets the requirements of the specified distance and pedal force. This allowance recognizes variability of test drivers and vehicles.

4. Parking brake system. The parking brake system proposal has also been adopted. When the parking brakes are applied, with a force not exceeding 90 pounds for a hand-operated system

or 125 pounds for a foot-operated system, the parking brake system shall be capable of holding the vehicle stationary for 5 minutes on a 30 per cent grade (20 per cent for vehicles of more than 10,000 pounds GVWR) in both forward and reverse directions. Optional requirements have been adopted for vehicles with a GVWR of 10,000 pounds or less, equipped with a transmission utilizing a parking pawl or detent mechanism within the transmission assembly. Vehicles so equipped may demonstrate compliance by (1) parking with both the parking brake and pawl engaged on a 30 per cent grade, (2) parking on a 20 per cent grade with only the parking brake engaged, and (3) being impacted front and rear, on a level surface, by a 4,000 pound moving barrier without disengagement or fracture of the pawl or detent mechanism.

5. *Reservoirs.* The master cylinder reservoir proposal has been adopted with modifications that allow balance ports and compartmentalized reservoirs in a single integrated master cylinder body and reservoir assembly, and that reduce fluid reservoir capacity requirements from 150 per cent to 100 per cent. The proposed cover, seal, and retention devices have not been adopted since pressure differential warning and low fluid level warning should provide a sufficient safety factor. The proposal was intended also to cover reservoir requirements in systems not using master cylinders and the revised wording of the section clarifies this point.

6. *Brake system indicator lamp.* The proposal would have required separate lamps to indicate when the parking brake is applied, and when a failure has occurred in the service brake system. Standard No. 105a requires only one lamp to serve these functions, to be labeled "Brake". Either the wording or the lens may be the color red. The lamp must light in the event of pressure failure in any part of the service brake system, other than a structural failure of a housing that is common to two or more subsystems, before or upon application of 50 pounds of pedal force upon a manually-operated service brake, or 25 pounds upon a service brake with a brake power assist unit, or when the supply pressure in a brake power unit drops to not less than one-half of the normal system pressure. The lamp must also light, without the application of pedal

force, when the level of brake fluid in the master cylinder reservoir drops to less than the recommended safe level specified by the manufacturer, or to not less than one-fourth the fluid reservoir capacity in any reservoir compartment, whichever is greater. This does not preclude the use of translucent covers or sight gauges in addition to the required lamp. Additionally, the lamp must illuminate when there is a total electrical failure in an antilock or brake proportioning system. All indicator lamps shall be activated when the ignition switch is turned from the "on" to the "start" position, which includes the air start condition on diesel-engine vehicles. The lamps will be deactivated upon return of the switch to the "on" position. No time interval is specified for deactivation, as the NHTSA recognizes that instant deactivation is impracticable for continuous sensing units.

7. *Miscellaneous.* The NHTSA proposed that service brakes be installed so that the lining thickness of drum brake shoes and disc brake pads might be visually inspected without removing the drums or pads. The possibility that contaminants may enter the system if plugs are removed, the differences between riveted and bonded lining thickness, and the location of inspection ports, were some of the technical and safety factors weighing in the conclusion to abandon this proposal.

The agency decided against the proposal that would have established suspension system durability requirements to be met following completion of tests. Since the vehicle must remain within a 12-foot-wide lane as a condition of the stopping distance tests, this will be a satisfactory demonstration of suspension system integrity.

Effective date: September 1, 1974. Because of the necessity to allow manufacturers sufficient production leadtime, it is found for good cause shown that an effective date later than one year after issuance of this rule is in the public interest.

In consideration of the foregoing, Title 49, Code of Federal Regulations, is amended by adding § 571.105a, Motor Vehicle Safety Standard No. 105a, *Hydraulic Brake Systems*, as set forth below.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and

Effective: September 1, 1974

Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on: August 23, 1972.

**Douglas W. Toms
Administrator**

**37 F.R. 17970
September 2, 1972**

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Issued on: August 23, 1972.

**Douglas W. Toms
Administrator**

**37 F.R. 17970
September 2, 1972**

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105a

Hydraulic Brake Systems

(Docket No. 70-27; Notice 7)

The purpose of this notice is to announce that the effective date of Motor Vehicle Safety Standard No. 105a will be September 1, 1975. Full response to petitions for reconsideration is scheduled for May 1, 1973.

Standard No. 105a, *Hydraulic Brake Systems*, was published on September 2, 1972 (37 F.R. 17970 with corrections at 37 F.R. 19138) with an effective date of September 1, 1974. On December 19, 1972, the NHTSA advised (37 F.R. 27629) that it intended to issue a notice by February 1, 1973, in response to petitions for reconsideration of the standard. The volume of the petitions received and the complexity of the issues involved are such that the agency has not found it possible to publish a full response to the petitions by the date indicated.

The NHTSA has, however, decided to grant petitions requesting a delay in the effective date, to the extent of a one-year postponement. Petitioners have demonstrated to the satisfaction of the agency that because of critical lead-time

problems the original effective date is impracticable. The NHTSA believes that in the additional year provided the industry will have sufficient time to increase the reliability of the systems that otherwise would have been incorporated beginning September 1, 1974, with the result that consumers will be provided with braking systems that have been optimized with respect to safety, performance, and cost.

The full response and discussion of issues raised by the petitioners is planned for issuance by May 1, 1973.

(Sec. 103, 119 P.L. 89-563, 80 Stat. 718, 15 USC 1392, 1407; delegation of authority at 49 CFR 1.51).

Issued on January 30, 1973.

Douglas W. Toms
Administrator

38 F.R. 3047
February 1, 1973

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Hydraulic Brake Systems

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PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105a

Hydraulic Brake Systems

(Docket No. 70-27; Notice 8)

This notice responds to petitions for reconsideration of Motor Vehicle Safety Standard No. 105a and amends the standard in certain respects, effective September 1, 1975.

Federal Motor Vehicle Safety Standard No. 105a, 49 CFR § 571.105a, was published on September 2, 1972 (37 F.R. 17970). Thereafter, pursuant to 49 CFR § 553.35 petitions for reconsideration of the rule were received from many interested corporations. A discussion of the major issues raised by the petitions and their resolution follows.

1. *Policy.* Several petitioners questioned the need for stringent braking requirements. The claim was made that NHTSA has shown neither a need based on accident data relating brake performance to deaths, injuries, or property damage, nor the benefits to be obtained from changed braking systems. Additionally, comments were received that most consumers could not utilize enhanced braking capabilities under most circumstances. Some also questioned the cost to implement the standard (allegedly \$40 an average per vehicle as a minimum, and up to \$75 in some instances for passenger cars).

The NHTSA does not agree with its critics on these policy issues. Braking system performance has consistently rated high on the safety criticality list. The dominance of the role of braking systems in accident avoidance maneuvers has long been recognized and undisputed. The importance of braking in motor vehicle safety is evidenced by the fact that of all vehicle defects which cause or contribute to accidents, brake failures lead the list. In the Consumer Information data on braking stopping distances provided by the automobile manufacturers, the better performing vehicles are reported to stop

from 60 mph in slightly more than one half the distance of the poorer performing vehicles. Large stopping distance differentials among vehicles operating in a common traffic stream are recognized as creating serious hazards to the motorist.

Data have shown that in many accidents a more effective service brake system would have lessened the severity of the collision or possibly averted it. Existing vehicles in many instances do have good braking capabilities but require excessive control forces to utilize these capabilities. Many drivers are not able to exert these forces and hence do not utilize existing systems to the fullest. With reduced stopping distances within the specified pedal forces required by Standard No. 105a, it is the opinion of NHTSA that deaths, injuries, and property damage will be reduced.

Since the requirements also specify that the stopping distances shall be achieved with the vehicle under control, stopping without locked wheels in a 12-foot-wide roadway lane, motorists will be afforded a greater opportunity to operate their brakes effectively in accident avoidance maneuvers.

Cost estimates submitted by petitioners are in agreement with those of the NHTSA. Based upon the information received from petitioners and the changes made as a consequence thereof, however, it is the opinion of this agency that the cost of implementation will be reduced to a figure commensurate with the safety benefits expected to be derived.

With respect to the performance levels specified, the NHTSA has determined that the values are reasonable and do not exceed the inherent capabilities of any of the various vehicle classes.

The values specified for vehicles other than passenger cars will considerably reduce the existing stopping distance differentials among vehicle classes.

Several petitioners commented on what they considered to be a lack of consistency in performance levels between vehicle types. For example, in the second effectiveness test, passenger cars, light trucks and heavy trucks have different performance requirements based upon weight and speed. Standard No. 105a was criticized also because the required stopping distances for heavy trucks with hydraulic brakes were more stringent than requirements for heavy trucks with air brakes (Standard No. 121, *Air Brake Systems*). It was argued that requirements should be the same for similar vehicles regardless of the type of brake system. Petitioners requested that partial failure system requirements, and requirements for failed power units, be identical to those for air-braked vehicles.

Other petitioners requested that emergency-type tests should allow locked wheels as in Standard No. 121. Petitioners, in several instances, requested changes in light load test requirements for the various vehicles. These requests were based on differences in load conditions, inertia load differences in stopping, center of gravity locations, and braking balance differences.

The standard has been amended to recognize the changes in performance due to vehicle weight differences, considering the effects of center of gravity location and weight shifts occurring during decelerations. Also, speed sensitivity effects have been recognized as occurring in all vehicles and appropriate modifications in requirements at the various test speeds have been made. Heavy vehicle requirements have been adjusted where appropriate to make them identical to those existing in Standard No. 121. Some differences have been retained, however. For example, fade tests in Standard No. 105a are run on the vehicle in a road test as compared with a dynamometer test in Standard No. 121. Dynamometer tests were selected in Standard No. 121 since vehicles used primarily in combinations are included in that standard. Compatibility between vehicles (tractor and trailer) was considered to be an important factor in the brake

system evaluation and could most easily be determined on the dynamometer.

Revisions to Standard 105a also have been made to allow wheel lockup on emergency-type tests such as spike stops, tests with failed power units, and partial system tests. Also, in the parking brake test, the limit of traction of the braked wheels is used in specifying parking brake system performance on a 30 per cent grade. There are no changes in parking braking system requirements because of weight differences. The NHTSA is of the opinion that all vehicles, regardless of weight class, are frequently parked in a lightly loaded condition and hence should be tested under this condition.

2. *Effective date.* The NHTSA has previously announced an overall delay of one year in the effective date of Standard No. 105a (38 F.R. 3097).

Petitioners generally considered the original effective date of September 1, 1974, to be unreasonable and impracticable. The earlier effective date as it applied to trucks, buses and multipurpose passenger vehicles coincided with the same effective date for Standard No. 121, issued some time before Standard No. 105a. The air brake systems will generally have new and larger foundation brakes, new suspensions and other related components, antilock or brake proportioning systems and new split systems as well as controls. Hydraulic-braked vehicles require in most instances similar changes to meet 105a requirements. However, manufacturers and suppliers had prior commitments to concentrate much of their available manpower, equipment and facilities to the development of conforming air brake systems. These manpower, equipment, and facilities are generally the same required for the development of conforming hydraulic-braked vehicles, and thus the changes to hydraulic-braked vehicles cannot be made simultaneously with air brake system changes. In addition, sufficient recognition must be given to the lead-time necessary for application studies, production standardization in areas where this is possible, drawing and specification preparation, tooling design time and procurement, and establishing manufacturing facilities. In some instances, plant facilities must be built along with con-

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Several petitioners requested an extension of the effective date for vehicles other than passenger cars beyond September 1, 1975. International Harvester requested a date of September 1, 1976 for these vehicles. Others would not predict a date on which they could meet the requirements.

Several commenters stressed the fact that metallic, semi-metallic, or ceramic linings, considered exotic materials presently, would probably be required to meet Standard No. 105a as of September 1, 1974. Resulting penalties would occur in cost (high wear, scoring, etc.) and poor or erratic performance under normal conditions.

Comments were also received concerning four-wheel drive vehicles. Low volume and consequent high costs for necessary changes are problems in this segment of the industry. Suppliers of components for these vehicles are allegedly reluctant to design and tool parts. In addition, manpower and facilities are not available for these jobs since most time and efforts must be utilized for the higher volume vehicles. An indefinite delay in an effective date for these vehicles has been requested.

After careful evaluation of all the petitions, the NHTSA considered that good cause had been shown for a delay of one year in the effective date of the standard. But it has been determined that a further delay, either for the standard or for separate vehicle categories is not in the interest of motor vehicle safety, and those petitions for a further extension of time are denied.

3. *Definitions.* Numerous comments were received on the definitions. In some instances amendments are made, in others, none. Clarifications have been provided where they were requested.

Questions relating to brake power assist units and brake power units have been raised. The distinction between the two is that a brake power assist unit has a push-through capability, i.e., the

operator can apply additional muscular effort and obtain braking action. A brake power unit does not have this capability. If power is lost, a driver cannot increase braking force by additional muscular effort on the control.

Some petitioners mentioned units which function in both modes, i.e., as a brake power unit in one condition, and as a brake power assist unit in a second condition. For example, a unit may function as a brake power unit under normal operating conditions, but when a power failure occurs, it operates as a brake power assist unit. For purposes of compliance, the failed mode of operation would be the critical mode. Therefore, with inoperative power units, the test requirements should be met depending on how the system operates in the failed mode. The example discussed above would be tested as a brake power assist unit.

The definition of "brake proportioning system" raised the question whether a fixed or variable system was intended. The term has been redesignated "variable brake proportioning system" to clarify the agency's intent.

The definition of "lightly loaded vehicle" does not specify an additional weight allowance for a load platform or body to be added to an incomplete vehicle, but in the opinion of some petitioners it should. Since the standard applies to complete vehicles, a manufacturer must use his discretion in applying additional weight to incomplete vehicles, taking into account the resulting changes in weight and center of gravity, when providing information on Standard No. 105a to subsequent multistage vehicle manufacturers.

Some manufacturers questioned the adequacy of the test surface specification: the "skid number" produced by American Society for Testing and Materials Method E-274, using a test trailer to measure the coefficient of friction. The complaint was made that the measurement results vary from one trailer to another, and vehicle performance results vary from one surface to another with supposedly the same skid number, on the order of 20 percent. It was also argued that the ASTM test was qualitatively inadequate, in that it measured sliding friction rather than peak or incipient friction.

The NHTSA does not accept these arguments. In the first place, it should be noted that thrust of the manufacturers' arguments is not only to abort this rulemaking, but to cast doubt on the validity of the existing braking standard. Whatever its shortcomings, the ASTM test is the only one to the knowledge of this agency that provides an objective and quantitative measure of the frictional characteristics of a road surface, and no other was suggested by petitioners. The present passenger car braking standard incorporates an SAE Recommended Practice (J843d) that specifies only a "dry, smooth, hard-surfaced roadway of Portland cement concrete (or other surface with equivalent coefficient of surface friction) that is free from loose materials," a far vaguer description.

Furthermore, the NHTSA does not find the argument based on variations in test results to be persuasive. The variations of 15 and 20 percent cited are extreme figures. With carefully calibrated and controlled test instruments and conditions, as specified in the standard, evidence before this agency indicates that the normally experienced variations are much smaller. Manufacturers have attempted to impose a criterion of perfect repeatability on the safety standards. Perfect repeatability, however, is an illusion. In the "real world" of materials testing, particularly of gross characteristics such as vehicle braking capability or crashworthiness, variation in results is inevitable; the question is not whether, but how much, variation is acceptable. Obviously, the standard should be designed to reasonably minimize the variability of test results, from the standpoint both of manufacturing costs and of effective regulation.

In this case, the ASTM method chosen was developed in 1965, and has been widely used since then for the purpose of vehicle performance testing. Moreover, it has been in force since 1970 in a closely similar NHTSA regulation: the Consumer Information regulation on Vehicle Stopping Distance (49 CFR 575.101), under which manufacturers have been required to test their vehicles' stopping-distance capabilities, and report them to consumers and to the NHTSA. The same statutory penalties have applied to a failure to meet these reported stopping distances when tested by the government as would apply

to a failure to meet the stopping distance required by a standard. In light of these factors, the arguments that the method for specifying the test surface is inadequate are found to be without merit.

The NHTSA also rejects the suggestion by the Recreational Vehicle Institute that this agency should supply or measure the test surface, because of the limited capabilities of motor home manufacturers. The clearly intended result of the National Traffic and Motor Vehicle Safety Act is that the private sector should bear the cost of regular conformity and certification testing. There is no requirement that each vehicle manufacturer have his own measured test track. Small manufacturers can have their vehicles tested by contract with testing companies; they can use their trade associations to arrange for use of measured test tracks in convenient regional locations; or they can work with the chassis manufacturer and use his test results.

The sudden application of force in a "spike stop" is 200 pounds applied in 0.08 second. Chrysler Corporation suggested a "band" of 0.05–0.20 seconds as permitted in SAE Recommended Practice J229 *Service Brake Structural Integrity Test Procedure*, March 1971. The purpose and legal significance of a test condition in a Federal motor vehicle safety standard are different from those of an industry test practice, and a band or tolerance as requested by Chrysler is inappropriate and unnecessary in the former. Assuming that a faster application is more demanding of vehicle performance, Chrysler in effect has a band from 0 to 0.08 second for its tests, which should be designed to show that the vehicle is capable of meeting the requirements with spike stops of 0.08 second.

The definition of "stopping distance" varied from the notice of proposed rulemaking in that the phrase "start of the brake application" was changed to "point of application of force to the brake control." Wagner Electric Co. considers the modified definition as more stringent since, in its view, the notice allowed both "force" and "movement" while the amendment allows only the former. The NHTSA disagrees with Wagner. Both versions refer purely to the brake pedal, and not to more remote parts of the brake

struction of development and test facilities. Petitioners also mentioned the significance of reduced product reliability if it is necessary to completely redesign entire vehicle lines simultaneously. Additional problems that can arise are related to the capability of the manufacturers to train adequately technical personnel to assemble, service, and maintain the new vehicles.

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Questions relating to brake power assist units and brake power units have been raised. The distinction between the two is that a brake power assist unit has a push-through capability, i.e., the

operator can apply additional muscular effort and obtain braking action. A brake power unit does not have this capability. If power is lost, a driver cannot increase braking force by additional muscular effort on the control.

Some petitioners mentioned units which function in both modes, i.e., as a brake power unit in one condition, and as a brake power assist unit in a second condition. For example, a unit may function as a brake power unit under normal operating conditions, but when a power failure occurs, it operates as a brake power assist unit. For purposes of compliance, the failed mode of operation would be the critical mode. Therefore, with inoperative power units, the test requirements should be met depending on how the system operates in the failed mode. The example discussed above would be tested as a brake power assist unit.

The definition of "brake proportioning system" raised the question whether a fixed or variable system was intended. The term has been redesignated "variable brake proportioning system" to clarify the agency's intent.

The definition of "lightly loaded vehicle" does not specify an additional weight allowance for a load platform or body to be added to an incomplete vehicle, but in the opinion of some petitioners it should. Since the standard applies to complete vehicles, a manufacturer must use his discretion in applying additional weight to incomplete vehicles, taking into account the resulting changes in weight and center of gravity, when providing information on Standard No. 105a to subsequent multistage vehicle manufacturers.

Some manufacturers questioned the adequacy of the test surface specification: the "skid number" produced by American Society for Testing and Materials Method E-274, using a test trailer to measure the coefficient of friction. The complaint was made that the measurement results vary from one trailer to another, and vehicle performance results vary from one surface to another with supposedly the same skid number, on the order of 20 percent. It was also argued that the ASTM test was qualitatively inadequate, in that it measured sliding friction rather than peak or incipient friction.

The NHTSA does not accept these arguments. In the first place, it should be noted that thrust of the manufacturers' arguments is not only to abort this rulemaking, but to cast doubt on the validity of the existing braking standard. Whatever its shortcomings, the ASTM test is the only one to the knowledge of this agency that provides an objective and quantitative measure of the frictional characteristics of a road surface, and no other was suggested by petitioners. The present passenger car braking standard incorporates an SAE Recommended Practice (J843d) that specifies only a "dry, smooth, hard-surfaced roadway of Portland cement concrete (or other surface with equivalent coefficient of surface friction) that is free from loose materials," a far vaguer description.

Furthermore, the NHTSA does not find the argument based on variations in test results to be persuasive. The variations of 15 and 20 percent cited are extreme figures. With carefully calibrated and controlled test instruments and conditions, as specified in the standard, evidence before this agency indicates that the normally experienced variations are much smaller. Manufacturers have attempted to impose a criterion of perfect repeatability on the safety standards. Perfect repeatability, however, is an illusion. In the "real world" of materials testing, particularly of gross characteristics such as vehicle braking capability or crashworthiness, variation in results is inevitable; the question is not whether, but how much, variation is acceptable. Obviously, the standard should be designed to reasonably minimize the variability of test results, from the standpoint both of manufacturing costs and of effective regulation.

In this case, the ASTM method chosen was developed in 1965, and has been widely used since then for the purpose of vehicle performance testing. Moreover, it has been in force since 1970 in a closely similar NHTSA regulation: the Consumer Information regulation on Vehicle Stopping Distance (49 CFR 575.101), under which manufacturers have been required to test their vehicles' stopping-distance capabilities, and report them to consumers and to the NHTSA. The same statutory penalties have applied to a failure to meet these reported stopping distances when tested by the government as would apply

to a failure to meet the stopping distance required by a standard. In light of these factors, the arguments that the method for specifying the test surface is inadequate are found to be without merit.

The NHTSA also rejects the suggestion by the Recreational Vehicle Institute that this agency should supply or measure the test surface, because of the limited capabilities of motor home manufacturers. The clearly intended result of the National Traffic and Motor Vehicle Safety Act is that the private sector should bear the cost of regular conformity and certification testing. There is no requirement that each vehicle manufacturer have his own measured test track. Small manufacturers can have their vehicles tested by contract with testing companies; they can use their trade associations to arrange for use of measured test tracks in convenient regional locations; or they can work with the chassis manufacturer and use his test results.

The sudden application of force in a "spike stop" is 200 pounds applied in 0.08 second. Chrysler Corporation suggested a "band" of 0.05–0.20 seconds as permitted in SAE Recommended Practice J229 *Service Brake Structural Integrity Test Procedure*, March 1971. The purpose and legal significance of a test condition in a Federal motor vehicle safety standard are different from those of an industry test practice, and a band or tolerance as requested by Chrysler is inappropriate and unnecessary in the former. Assuming that a faster application is more demanding of vehicle performance, Chrysler in effect has a band from 0 to 0.08 second for its tests, which should be designed to show that the vehicle is capable of meeting the requirements with spike stops of 0.08 second.

The definition of "stopping distance" varied from the notice of proposed rulemaking in that the phrase "start of the brake application" was changed to "point of application of force to the brake control." Wagner Electric Co. considers the modified definition as more stringent since, in its view, the notice allowed both "force" and "movement" while the amendment allows only the former. The NHTSA disagrees with Wagner. Both versions refer purely to the brake pedal, and not to more remote parts of the brake

system. This agency is unaware of any measurable difference in time between the introduction of force to the pedal and the initiation of pedal movement, and Wagner has supplied no evidence to the contrary. The modified wording has been adopted for purposes of clarity.

General Motors objected to stopping distances as performance requirements, and expressed its views that deceleration rates provide more objective performance criteria. This represented a departure from GM's previous views that build-up and maintenance of a fixed deceleration depended upon varying driver skills, affecting reproducibility. The variety in driver skills is one reason the NHTSA considers measurement of a specified distance more desirable than maintenance of a fixed deceleration rate. Insertion of a fixed build-up time would introduce a complication. The stopping distances specified do not include a fixed build-up time but instead allow use of various characteristics, including greater or lesser build-up times, as long as the vehicle does not exceed the stopping distance specified. A specified maximum (but not fixed) build-up time is used in fade tests where decelerations are specified. Further, the distances expressed in Standard No. 105a are maximum distances, and manufacturers will necessarily design their vehicles to perform with a margin within those limits, thus reducing problems of objective measurement.

4. *Required stopping distances and pedal control forces.* The stopping distance values, in most instances, were considered by petitioners to require redesigned braking systems. In some cases, larger brake systems would be required, incorporating front disc brakes with power assist and larger rear drum brakes. Other vehicles, particularly trucks, buses, and multipurpose passenger vehicles, would require the addition of antilock systems or brake proportioning systems, along with new types of split systems (or completely redundant systems). These systems, it is alleged, would be required to meet the full system effectiveness and the partial system effectiveness requirements.

The 30 mph and maximum speed stopping distances were considered too stringent by most petitioners. The very short stops involved, along

with the buildup or actuation time necessary, were the main problems in the 30-mph tests. The problem of the speed sensitivity of lining materials was the main factor noted in comments relating to the high speed and maximum speed tests.

For first effectiveness test, recommended changes in stopping distances ranged at 30 mph from no increase to an increase of 9 feet for passenger cars, 7 feet for light trucks, and 20 feet for heavy trucks. At 60 mph, requests for increases of up to 17 feet for passenger cars, 7 feet for light trucks, and 75 feet for heavy trucks were received. Two petitioners suggested deleting heavy truck requirements, either to be consistent with Standard No. 121 or until "more realistic data" was available.

The second through fourth effectiveness tests were more severely criticized by petitioners. Several suggested that fourth effectiveness test values be increased to at least those used in the first effectiveness tests (involving increases of 5, 7 and 10 feet at 30 mph, and changes of 20, 26, and 32 feet at 60 mph, for passenger cars, light trucks and heavy trucks, respectively). Several commenters recommended deletion of tests at speeds greater than 80 mph. For light and heavy trucks, maximum speeds of 60 mph to 80 mph were recommended.

Certain modifications in stopping distances and test speeds have been made in response to these comments. The maximum test speed for a vehicle with a GVWR that exceeds 10,000 pounds has been reduced from 80 mph to 60 mph. The maximum test speed will be 100 mph, specified only for those passenger cars which attain a speed of 104 mph or greater in 2 miles. If the speed that a passenger car is capable of attaining in 2 miles is from 99 to 104 mph, its maximum test speed will be 95 mph. Intermediate test speeds between 80 and 95 mph, and 60 and 80 mph have also been eliminated for all vehicles; thus if a vehicle's top speed is from 84 to 99 mph, its top test speed is 80 mph; if the top speed is from 64 to 84 mph, its top test speed is 60 mph. Stopping distances have been increased slightly in most instances from those previously required; an example is the second effectiveness test where the 60-mph stopping distance for pas-

senger cars at GVWR will be 204 feet rather than 194. Under partial failure conditions at the same speed, the stopping distance for passenger cars has been increased from 431 to 456 feet.

Standard No. 105a required stops to be made at pedal forces that varied from 15 to 100 pounds at stops from 30 mph, to 20 to 150 pounds at stops from 65 mph or higher. Pedal control force values were objected to and requests for changes were made, ranging from an increase at 30 mph to 120 pounds to an across the board increase to 150 pounds maximum for all tests. Petitions were based generally on the need either to allow higher pedal forces to reduce brake sensitivity or to provide a simple single value for all tests. A change to allow 200 pounds of maximum pedal force on parking brake tests for light trucks was also requested. Several petitioners also requested modifications in fade recovery test pedal force values.

The NHTSA considers that most of these requests are meritorious. The standard is being amended to specify a uniform force range of 15 to 150 pounds for all stops that must be made within required stopping distances, and this will be expressed as a test condition in paragraph S6. However, the parking brake test pedal forces must, in the opinion of the NHTSA remain uniform at 125 and 90 pounds (foot and hand) and the petition on this point is denied. General Motors requested a force for the 5th (final) fade recovery stop that is within plus 50 pounds and minus 5 pounds or minus 40 percent (whichever is greater) of the average control force for the baseline check. These values are considered too broad. Some relief is deemed warranted, however, and Japan Automobile Manufacturers Association's suggested value of minus 10 pounds has been adopted.

5. Inoperative power units. In addition to the requests for clarification between brake power assist units and brake power units petitioners requested changes in requirements that would recognize the reserve capabilities that have been designed into the inoperative mode of some power systems. These petitions have been granted, and tests with an inoperative brake power unit or power assist unit have been modified to allow

optional utilization of reserve capabilities in stopping. Under the optional procedure a vehicle makes a series of stops from 60 mph at specified decelerations when the inoperative unit is not initially depleted of all reserve capability and in a final stop within 554 feet when the unit has been depleted of its reserve.

6. Fade and recovery requirements. Standard No. 105a required that vehicles with a GVWR of 10,000 pounds or less demonstrate fade resistance in two fade and recovery tests of 10 and 15 stops each from 60 mph at 15 fpsps.

Fade and recovery requirements were considered extremely stringent by petitioners. Several petitioners suggested a reversion to the existing requirements with minor modifications. Others suggested changes in test weights. Most were willing to accept the 150-pound pedal force limitation if other modifications proposed were acceptable. GM recommended that two different fade test procedures be adopted, the first simulating a mountain type fade test at GVWR with increased distance intervals, and the second being similar to that adopted except at a reduced test load.

These petitions have been deemed in large part to have merit, and the two fade tests will be revised to consist of 5 and 10 fade stops at 15 fpsps, each followed by an additional 5 stops at the maximum deceleration attainable between 5 and 15 fpsps. The fade test requirements for vehicles with a GVWR in excess of 10,000 pounds remains unchanged. However, no procedure simulating mountain descents has been developed, and GM's request is denied. International Harvester, in the fade test procedure, requested that the time to attain the required deceleration presently 1 second, be increased to 5 seconds. This request is denied, since an increase has been found unnecessary.

7. Water recovery. GM petitioned for substantial changes in the water recovery test, asking relocation within the test sequence, modified control forces, and increased number of recovery stops for heavy trucks. None of these requests has been found to have merit. A change in sequence would necessitate reevaluation of the effect of the standard with a possible consequent further delay in the effective date.

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9. *Parking brake systems.* The parking brake system requirements, particularly in the lightly loaded vehicle condition, were objected to as violating the laws of physics. As mentioned earlier, petitioners generally requested inclusion of a "limit of traction" condition. Vehicles with a great range of loading conditions are allegedly incapable of holding on grades specified in the requirements (20 percent or 30 percent). Particular stress was placed on brake holding capability on a 75 skid number surface. One commenter requested that the same requirements apply to all vehicles, claiming it unrealistic for light vehicles to meet the 30 percent grade requirement while heavy vehicles only had to meet a 20 percent requirement, and suggested use of a Swedish standard (16 percent grade, 110 pounds of foot brake force, 88 pounds of hand brake force). Ford requested allowance for use of a multistroke parking brake application. American Motors Corporation requested reinstatement of existing Standard No. 105 requirements. GM and Chrysler objected to the requirement that the parking brake be of a "friction type" which they considered design restrictive, prohibiting other acceptable parking brake systems.

The parking brake system test remains substantially as adopted. The performance requirements have been found feasible with present technology. A multistroke application is permissible, and limit of traction language has been added to the 30 percent grade requirement, to eliminate the irrelevant problem of tire slippage.

The requirement for a friction-type parking brake is also retained. In a case of complete loss of service brake capability, a friction-type parking brake furnishes a residual stopping capability for a moving vehicle that is absent in a pawl-type system (such as the "park" position transmission stop). If the phrase "friction type" appears design restrictive of other types of parking brake systems that would provide equivalent capability, this agency will be receptive to suggestions for substitute language, with adequate supporting information.

Wagner petitioned for deletion of the parking brake test with the vehicle at lightly loaded weight. This request is denied as the NHTSA believes that vehicles are frequently parked in a lightly loaded condition, and that a test should therefore be run at this vehicle weight.

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11. *Reservoirs.* In the requirements for the master cylinder reservoir, clarifications have been provided in the determination of a fully worn, fully applied lining position. Reservoir labeling has been modified to require color contrasts of printed labels only, the contrast in lettering and

background on stamped or embossed labels deemed a sufficient contrast in those instances. GM asserted that the reservoir capacity requirements were unnecessary in light of the requirement for a fluid level indicator, and petitioned that the requirements be deleted. The petition is denied; the volume requirements are necessary to provide sufficient fluid for a full range of brake travel.

12. *Test conditions.* The specified test load of 50 to 725 pounds per cubic foot has been refined by assigning density distribution to various vehicle areas, for example 50 to 125 pounds per cubic foot in the seating area of all vehicles. Several manufacturers requested that the transmission selector control be in gear during all test decelerations, alleging that the neutral position is not representative of consumer usage. These requests are denied. Deceleration in gear by adding driveline drag masks the true effectiveness of the brake system. Comments were also directed to the prohibition against lockups, generally alleging inconsistency with Standard No. 121. These comments had merit, and the test condition has been amended to allow lockups during spike stops, partial failure stops and inoperative brake power or power assist unit stops. On the other hand, a request to allow more than one locked wheel is denied. Provision has been made for installation of a second thermocouple at the beginning of the test sequence if the lining wear is expected to reach a point causing the first thermocouple to contact the metal rubbing surface of a drum or rotor. Since the brake control forces have been modified to a uniform range of 15 to 150 pounds, except as otherwise specified, control forces have been added to the list of test conditions.

13. *Test procedures and sequence.* Most American manufacturers and suppliers commented on the severity of the sequential procedure, with arguments of the following nature: The high speed effectiveness tests early in the sequence result in changes in lining characteristics which, in turn, affect the capability of the vehicles to comply with parking brake and partial systems requirements. Since no reburnish is allowed until after the first fade test, additional lining deterioration occurs as light load tests and fade

tests are run. When final effectiveness tests are run, organic linings (normally used in today's vehicles) have deteriorated appreciably. This sequential testing, without reconditioning at intervals, results in brake torque balance changes as the test sequence progresses. To offset these changes and to enable a vehicle to go through compliance tests satisfactorily, many vehicles would have to be designed with an initial high gear brake capacity. This results in an unsafe early rear brake lockup, particularly at the initial light load test. As the sequence progresses, brake balance shifts toward a more reasonable balance, where all wheels approach lockup at or near same point. A brake balance which is designed initially for GVWR test conditions to meet Standard 105a requirements, would be dangerous to consumers for normal usage at 2 to 3 passenger loads due to rear wheel lockup and resultant uncontrollable skids. Recommendations by petitioners generally favored less testing at GVWR, reduced maximum test speeds, lessened fade requirements, and lessened final effectiveness requirements. The various changes would allow design of a brake system more suitable to normal consumer usage rather than the usage encountered in 105a tests. Ford recommended some changes in sequence but submitted a procedure incorporating the 105a sequence with modified performance requirements. GM suggested a drastically revised sequence along with reduced performance requirements. Several petitioners recommended additional burnish stops and adjustments at several points, generally after each effectiveness series. Ford proposed a 200 stop additional burnish after the second fade test.

In responding to petitions for reconsideration, the NHTSA has not modified the sequence of the test procedure. Recognizing the validity of many of the comments, the NHTSA instead has adjusted all vehicle performance values to more closely correlate sequential testing with normal everyday driving performance. This has been accomplished by (1) reducing the high speed performance requirements, (2) eliminating high speed performance requirements at early sequence test points and retaining them only in the last effectiveness test, (3) allowing extra burnish stops for reconditioning of the lining materials, (4) modifying fade performance requirements,

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tests are run. When final effectiveness tests are run, organic linings (normally used in today's vehicles) have deteriorated appreciably. This sequential testing, without reconditioning at intervals, results in brake torque balance changes as the test sequence progresses. To offset these changes and to enable a vehicle to go through compliance tests satisfactorily, many vehicles would have to be designed with an initial high gear brake capacity. This results in an unsafe early rear brake lockup, particularly at the initial light load test. As the sequence progresses, brake balance shifts toward a more reasonable balance, where all wheels approach lockup at or near same point. A brake balance which is designed initially for GVWR test conditions to meet Standard 105a requirements, would be dangerous to consumers for normal usage at 2 to 3 passenger loads due to rear wheel lockup and resultant uncontrollable skids. Recommendations by petitioners generally favored less testing at GVWR, reduced maximum test speeds, lessened fade requirements, and lessened final effectiveness requirements. The various changes would allow design of a brake system more suitable to normal consumer usage rather than the usage encountered in 105a tests. Ford recommended some changes in sequence but submitted a procedure incorporating the 105a sequence with modified performance requirements. GM suggested a drastically revised sequence along with reduced performance requirements. Several petitioners recommended additional burnish stops and adjustments at several points, generally after each effectiveness series. Ford proposed a 200 stop additional burnish after the second fade test.

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(5) allowing a broader range of control force requirements while maintaining a maximum force limit of 150 pounds, (6) allowing extra adjustments of the brake system during the test sequence to provide more optimum brake performance, (7) modifying fade and wet-brake control force requirements to allow a broader range of forces without allowing a range that might produce severe over- or under-recovery. These modifications are intended to allow manufacturers to design braking systems with a balance that will provide satisfactory overall performance.

At Ford's request, the general test procedure instructions have been modified to require lock-out of automatic adjusters prior to burnish and for the remainder of the test sequence.

For the pretest instrumentation check, requests were received to specify a minimum number of instrumentation check stops or snubs, as well as the presently specified maximum. Such a specification would, however, be meaningless. With the maximum number specified, each manufac-

turer knows precisely the "worst case" that his vehicles must be designed for, and should test his vehicles at or above that level.

In consideration of the foregoing, 49 CFR § 571.105a, Motor Vehicle Safety Standard No. 105a, is revised to read as set forth below.

Effective date: September 1, 1975. Because these amendments relate to a standard that is effective September 1, 1975, it has been determined for good cause shown that an effective date later than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 USC 1392, 1407; delegation of authority at 38 F.R. 12147).

Issued on: May 11, 1973.

James E. Wilson
Associate Administrator
Traffic Safety Programs

38 F.R. 13017
May 18, 1973

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PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75**Hydraulic Brake Systems****(Docket No. 70-27; Notice 10)**

This notice responds to further petitions for reconsideration of Motor Vehicle Safety Standard No. 105a and amends the standard in certain minor respects effective September 1, 1975.

Federal Motor Vehicle Safety Standard No. 105a, 49 CFR 571.105a, *Hydraulic brake systems*, was published on September 2, 1972 (37 F.R. 17970). Thereafter, pursuant to 49 CFR 553.35, petitions for reconsideration of the rule were received and, in response, a revised Standard No. 105a was published on May 18, 1973 (38 F.R. 13017). Timely petitions for reconsideration of the revised rule were received from American Motors Corporation (AMC), Wagner Electric Corporation (Wagner), General Motors Corporation (GM), International Harvester Company (Harvester), Japan Automobile Manufacturers Association (JAMA), Ford Motor Company (Ford), Recreational Vehicle Institute (RVI), and Toyota Motor Sales, USA, Inc. (Toyota). This notice discusses the major issues raised and their resolution. The Administrator does not consider repetitious petitions and to the extent that these further petitions were repetitions of the initial ones (*e.g.* deletion of tests above 80 mi/h for heavy vehicles, modification of pedal forces, running tests in gear rather than in neutral), they have not been considered, pursuant to NHTSA regulations (49 CFR 553.35 (c)).

GM petitioned for rulemaking that would rescind Standard No. 105a on the grounds that the brake systems it has designed for the 1976 model year would have to undergo substantial changes in subsequent model years when it plans to introduce lighter vehicles with improved fuel consumption. This agency considers energy needs along with other factors relevant to its rulemak-

ing actions. The information available to the NHTSA does not indicate, however, that Standard No. 105a is incompatible with increased fuel mileage, or would add substantially to the weight of the vehicles covered. The NHTSA does not consider a change in a manufacturer's own design plans to be a justification for discarding an important new set of requirements for which the world industry has been preparing for several years. The petition by GM to rescind the standard is therefore denied.

Effective date: Harvester and RVI petitioned for a delayed effective date for certain categories of vehicles. Harvester requested a one-year delay in the effective date for vehicles whose GVWR exceeds 10,000 pounds, stating its doubt that acceptable antilock systems will be available to it by September 1, 1975, and that the advance hardware proposals from its brake system suppliers indicate that considerable design and development time is still needed. RVI wished an extension of 2 years for recreational vehicles built upon truck and multipurpose passenger vehicle chassis, alleging that time will be needed for testing and retooling after receipt of the first chassis or vehicle certified as conforming to the new braking standard.

The NHTSA does not consider further extension of the effective date to be in the public interest, and the petitions are denied. The broad outlines of the performance requirements have been known to industry since publication of the initial proposal in November, 1970, with its proposed effective date of September 1, 1972. Since publication of the new standard in September, 1972, the effective date has been delayed one year to September 1, 1975, and considerable relief provided for vehicles whose GVWR exceeds 10,000 pounds.

Definitions. In response to a petition by JAMA, a definition of "backup system" is adopted. Such a system is "a portion of a service brake system, such as a pump, that supplies energy in the event of a primary brake power source failure".

Effective requirements. Clarifying words are added throughout in response to various requests. For example, the fourth effectiveness test now makes it clear that if the speed attainable in 2 miles is 99 mi/h or greater, stops must be made from both 80 mi/h and a specified higher speed, and not from the higher speed alone. In response to GM's comments on inoperative brake power and power assist units (S5.1.3), a new S5.1.3.4 has been adopted that allows brake power assist units to be tested under the optional procedure if the unit utilizes a backup system.

The word "average" has been deleted from S5.1.4.2 (fade and recovery) which specified fade stops in excess of "an average deceleration" floor, at the request of Wagner, as the inclusion of the word was erroneous and does not reflect the test procedures of S7.11.2.1.

The brake system indicator lamp requirements (S5.3.1) were the subject of numerous petitions, most of which have been granted. The NHTSA reiterates that the methods of pressure failure indication in S5.3.1(a) are alternative rather than inclusive. Harvester asked that S5.3.1(a) be amended to delete the qualification of pressure measurement at a slave cylinder outlet "if the master cylinder controls slave cylinders at a booster unit". It argues that with this design configuration it should be allowed to measure pressure at the master cylinder outlet. The NHTSA agrees that the original wording of S5.3.1(a) is design restrictive and that measurement at either the master or slave cylinder outlet is satisfactory for monitoring pressure, and the qualifying phrase is removed. S5.3.1(a)(1) requires activation of the indicator upon activation of "a line pressure of not more than 200 psi". Ford requested an amendment to clarify that the intent is to specify a differential pressure between the operational and failed brake systems. The clarifying amendment has been made and the pressure differential increased to 225 psi to compensate for certain power-assisted units. As a

failure indicator GM prefers a switch that would activate the warning lamp when the brake pedal has been depressed past a certain point, rather than a lamp activated by fluid pressure failure.

The petition is denied, as the NHTSA has determined that the brake pedal travel involved to activate the lamp would not provide an adequate warning.

JAMA and Toyota asked for an amendment or interpretation of S5.3.2 that would allow the indicator lamp to remain activated when the ignition is returned to "on", after the engine is started. To allow the lamp to remain on after the engine is started might degrade the importance of the check that the system is intended to indicate, and that the request is denied. JAMA also requested that if there is a separate parking brake indicator that it be labelled "Park", and this petition has been granted.

GM requested that the volume requirements of master cylinder reservoirs on large trucks be reduced to one-third that required by the new standard. Since NHTSA has reduced the requirement in response to previous petitions, from 150 per cent to 100 per cent of fluid displacement, it does not deem it in the interest of safety to reduce it further. GM's petition is denied. The agency wishes to clarify, however, that the volume concerned is only that within the storage compartment, and does not include that fluid which may remain in pipes, hoses, and fittings. At Harvester's request, S5.4.2 is amended slightly to clarify that the minimum reservoir capacity is that of the total reservoir system rather than each reservoir compartment.

S5.6, *Brake system integrity*, had been amended in May 1973 to specify that friction facing tear-out of the lining must "not exceed 10 percent of the lining on any frictional element" rather than "10 percent of the lining surface areas". GM requested reinstatement of the original requirement. The request is denied. The language that was adopted in May 1973 clarified a previously existing ambiguity while providing a measure of relief that had been previously requested.

Conditions. Ford interpreted the words "test load" in S6.1.1 as the load required to be added to bring a vehicle to its GVWR. In some instances, if this added weight were distributed

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proportionally to GAWR the front GAWR would be exceeded. NHTSA intended that a vehicle be loaded at GVWR so that its gross vehicle weight is distributed proportionally to its GAWR, and S6.1 is amended appropriately. Ford, JAMA, Toyota, and RVI petitioned for a change in the load material density specification of S6.2 to allow use of iron shot or bars in the passenger seating area, or in cargo areas of light and heavy trucks. The RVI request would allow use of lead shot in drawers, cupboards, and cabinets of recreational vehicles. In large part, these requests have been granted; maximum material densities have been increased from 125 to 450 pounds per cubic foot in seating areas of passenger cars, and in cargo areas of vehicles with a GVWR of 10,000 pounds or less. To allow the use of cast iron in the cargo areas of heavy trucks the minimum density has been lowered slightly from 450 to 400 pounds per cubic foot. The RVI request, however, is not adopted as this would permit too broad a range for testing and consequent difficulty of reproducing test results. It was to alleviate this problem that the original Standard No. 105a was amended on this point in May 1973. AMC and GM asked that the tire inflation pressure be that specified for the test weight, rather than for the GVWR of the vehicle. In NHTSA's view, the time to reset tire pressures after allowing tires to cool would complicate and lengthen test procedures. There are only three tests run at the lightly loaded weight, and no data have been submitted to show that the tire pressure required causes a substantial increase in stopping distances.

S6.10 allows only one uncontrolled wheel to lock at braking speeds above 10 mph on any given stop. GM suggested that this section allowed one wheel per axle to lock. GM's interpretation is incorrect, however; "one wheel" means one wheel on the vehicle. Ford wanted to reset thermocouples during brake inspections. This requested amendment is denied. Except for normal adjustment, inspections for thermocouple depths are not allowed once a test series has begun, in order that brake systems not be disturbed. The NHTSA may consider different depths for thermocouples in the future if data are obtained showing a need.

Test procedures. GM, JAMA, Toyota, and RVI petitioned that lockout of automatic brake adjusters be optional rather than required. On review the NHTSA has decided that there is no reason not to allow use of adjusters during testing. However, if a manufacturer locks out brake adjusters, this will now occur when linings are installed after the thermocouple installation; *i.e.* before the test series rather than before burnish. This is intended to save time in the test procedures.

The service brake burnish procedure for heavy vehicles is being amended pursuant to a petition by GM, to be in accord with the procedure recently proposed for such vehicles in Standard No. 121. Minor clarifying amendments have been made at various places in the test procedures. Toyota asked whether S7.9.4 applied only to mechanical proportioning systems. This paragraph applies to any variable proportioning system whether mechanical, electrical, hydraulic or otherwise. It does not apply to a fixed mechanical proportioning system.

Figures and tables. Pursuant to a request from Ford, the dimensional specification of "1½ inches" has been added to Lever A on Figure II. JAMA and Toyota want to consider a modified T lever as a "T" rather than as an "L" type. The NHTSA will consider this design a "T" type if the short side is no less than one-third the long side. JAMA and Toyota requested that the load point on the "L" type handle be revised to 1½ inches from the handle end instead of from the center line. This request is denied, as the original requested dimension (30 mm) has been previously increased to 1½ inches (approximately 37 mm) and no further change is deemed necessary.

Harvester was the sole petitioner to request an increase in the stopping distances of Table II, asking that vehicles with a GVWR of 10,000 pounds or less in the lightly loaded condition be afforded the same maximum stopping distance from 60 mph as required of similarly loaded vehicles under the same conditions in Standard No. 121. It also requested an increase in the fourth effectiveness stopping distance to give the same difference in deceleration at 80 mi/h as allowed by Standard No. 105 at 60 mi/h. Both

petitions are denied. Air-braked vehicles covered by Standard No. 121 include truck-tractors with a high center of gravity and usually a higher front-to-rear weight distribution than light trucks, so that the lesser stopping distance in Standard No. 105 is justified. The test value of the fourth effectiveness test reflects previous modifications for requirements at 60 mi/h. The industry in general has not disclosed any problem in complying with the deceleration values from 80 mi/h. The correct stopping distance for heavy vehicles from 50 mi/h in the first, fourth, and spike effectiveness tests is 193 feet, not 183 feet as previously published.

GM, Toyota, and JAMA requested an increase in the deceleration values of Table III as an allowance for larger vehicles tested to optional brake power and assist unit procedures. This request is denied. These vehicles are presently required to meet only a 6.3 ft/s/s deceleration which is considered the minimum value acceptable.

Finally, Harvester wanted an inclusive pedal force range of 15 to 150 pounds for all phases of compliance activity including baseline checks. The NHTSA considers a 150-pound pedal force too high for baseline tests at low speeds and

relatively low decelerations, and the petition is denied.

Although the NHTSA has on occasion used the subletter "a" to denote comprehensive revision of existing standards effective at a future date, such standards will henceforth be identified in terms of their effective dates. Thus "Standard No. 105a" becomes "Standard No. 105-75 (effective September 1, 1975)".

In consideration of the foregoing 49 CFR 571.105a, Motor Vehicle Safety Standard 105a, hydraulic brake systems, is amended as follows:

Effective date: September 1, 1975. Because these amendments relate to a standard that is effective September 1, 1975, it has been determined for good cause shown that an effective date later than 1 year after issuance is in the public interest.

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petitions are denied. Air-braked vehicles covered by Standard No. 121 include truck-tractors with a high center of gravity and usually a higher front-to-rear weight distribution than light trucks, so that the lesser stopping distance in Standard No. 105 is justified. The test value of the fourth effectiveness test reflects previous modifications for requirements at 60 mi/h. The industry in general has not disclosed any problem in complying with the deceleration values from 80 mi/h. The correct stopping distance for heavy vehicles from 50 mi/h in the first, fourth, and spike effectiveness tests is 193 feet, not 183 feet as previously published.

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Issued on February 14, 1974.

James B. Gregory
Administrator
39 F.R. 6708
February 22, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75

Hydraulic Brake Systems

(Docket No. 70-27; Notice 11)

This notice responds to petitions for reconsideration of the amendments to 49 CFR 571.105-75, Motor Vehicle Safety Standard No. 105-75, published in the *Federal Register* on February 22, 1974 (39 F.R. 6708). The standard is amended to defer for one year the requirements for a brake fluid level sensor for vehicles with a GVWR over 10,000 pounds, and for two years, a 60-pound maximum baseline pedal effort on vehicles with a GVWR over 15,000 pounds. Slightly increased stopping distances in the third effectiveness test are adopted for one year for certain heavy vehicles at lightly loaded vehicle weight.

Timely petitions for reconsideration of the amendments were received from Girling, Ltd., Wagner Electric Corporation (Wagner), Ford Motor Company (Ford), General Motors Corporation (GM), and Recreational Vehicle Institute, Inc. (RVI). International Harvester Company (Harvester), subsequent to the time allowed for filing petitions for reconsideration, raised certain issues in writing to the Administrator, and its presentation, in accordance with NHTSA regulations, has been considered as a petition for rulemaking. This notice discusses the major issues raised and their resolution.

Effective date: RVI again petitioned for a delayed effective date for recreational vehicles built upon truck and multipurpose passenger vehicles chassis, alleging that time will be needed by final-stage manufacturers for testing and retooling after receipt of the first chassis or vehicle manufactured after the effective date of Standard No. 105-75.

RVI's petition is found to be repetitious of arguments raised previously, and accordingly, pursuant to NHTSA regulations (49 CFR

553.35(c)), has not been granted. The denial of Notice 10 therefore stands, on the grounds set forth in Notice 10 of this docket. In brief, the NHTSA expects a manufacturer of incomplete vehicles to provide final-stage manufacturers, pursuant to 49 CFR 568, with information sufficient to indicate how the final-stage manufacturer may achieve compliance with Standard No. 105-75. Since the effective date of the standard is over a year away, there remains sufficient time for final-stage manufacturers to discuss with manufacturers of incomplete vehicles the kind of information that is to be provided, and to resolve such problems as may appear.

Harvester and Wagner have apprised the NHTSA of unexpected leadtime problems associated with the incorporation of brake fluid indicators into master cylinders of heavy vehicles. The agency has confirmed the seriousness of these problems, and has determined that they derive from factors substantially beyond the control of the affected vehicle manufacturers. It has accordingly concluded that a 1-year delay in the required date for introduction of fluid level sensors for vehicles whose GVWR exceeds 10,000 pounds would be in the public interest.

Harvester also requested a year's delay of the third effectiveness test requirements (S5.1.1.3). It stated that vehicles with 151 inches or less wheelbase and 8,000 pounds or greater GVWR will require anti-lock systems to meet the stopping distance requirements for lightly loaded vehicles, and that suitable anti-lock systems cannot be developed for 1976 model year production. The NHTSA does not consider that a year's delay of the third effectiveness test requirements is in the public interest. It finds, however, on the basis of the information before it that the

incorporation of anti-lock systems into this class of vehicles by the September 1, 1975, effective date is probably impracticable. The standard accordingly is being amended to permit, for a period of 1 year, somewhat longer stopping distance requirements for lightly loaded vehicles of 8,000 pounds or more GVWR. The NHTSA finds these distances to be achievable without anti-lock systems, and that the change for the interim period is justifiable in terms of the costs and the safety benefits involved. As an example, the maximum stopping distance permissible from 60 mph at lightly loaded vehicle weight is changed from 216 feet to 242 feet for vehicles with a GVWR between 8,000 and 10,000 pounds.

Effectiveness requirements. Clarifying words are again added to the effectiveness requirements and test procedures in response to various requests. Heretofore the performance requirements for vehicles with inoperative brake power assist units and brake power units specified four stops at a deceleration figure, with the fifth and final stop specified in feet. This has apparently proved confusing, and the final stop will now be expressed in a manner consistent with the remainder of the performance requirements, as "an average deceleration of not lower than 7 fpsps". This value, however, applies only to passenger cars. Ford argued that the heavy truck stopping distance values are unrealistic, in the optional procedures provided by S5.1.3.2 and S5.1.3.3 for inoperative brake power assist units and brake power units. It petitioned for less stringent values. The agency has considered that Ford's views have merit, and is amending the standard to require a final stop at an average deceleration of not lower than 6 fpsps. Table III has been amended to reflect this change.

Two petitioners contested the pedal force baseline value range of 15 to 60 pounds for the fade and recovery and water recovery demonstrations. GM asked that the minimum be reduced to 10 pounds, while Harvester requested an increase in the maximum to 88 pounds. GM submitted new test data to substantiate its request and its petition is granted; but a floor of 5 pounds is placed on the recovery minimum value. Harvester's petition is predicated on the results of "extensive tests" that show "that no vehicle over 15,000 lbs. GVWR can be brought

into compliance with this requirement for model year 1976." In recognition that even exerting its best efforts Harvester cannot comply by September 1, 1975, the NHTSA has determined that a relaxation of this requirement for two years would be in the public interest. Therefore, Harvester's petition is granted, and between September 1, 1975, and September 1, 1977, the maximum baseline pedal effort will be 90 pounds with a restriction on fade recovery of 100 pounds maximum, and of 110 pounds on water recovery.

With respect to the brake failure indicator lamp, Ford and Wagner requested clarification that the pressure failure condition is a rupture type, rather than one resulting from slow leaks. This request is granted, and S5.3.1(a) is amended to specify that the failure causing the lamp to operate is "A gross loss of pressure (such as caused by a rupture of a brake line)" Wagner also asked whether an automatic reset pressure failure valve would violate the standard. When there is a slow leak in the service brake system, the warning valve will shuttle, activating the indicator lamp, but the lamp will not remain activated when the pedal is released and then reapplied. The NHTSA intends the fluid level indicator to warn of fluid loss due to slow leaks, and the pressure differential indicator to warn of gross pressure loss. The failure of the lamps to remain activated by the valve does not violate Standard No. 105-75.

Some petitioners cited an apparent conflict in the previous denial of Toyota's petition to allow an indicator lamp to remain activated when the ignition is returned to "on" after the engine is started, and the fact that some systems do not instantly deactivate. NHTSA has previously noted in the notice of September 2, 1972 (37 F.R. 17970), that no time interval is specified, and that instantaneous deactivation could not be required of continuous sensing units. The indicators considered acceptable to NHTSA are those that may remain activated for a limited time (such as 1 to 10 seconds) after the ignition is returned to "on".

Finally, Wagner petitioned for reinstatement of the limiting phrase "in any reservoir compartment" in the requirement that an indicator lamp be activated whenever there is a drop in the level of brake fluid in a master cylinder reservoir to

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75**Hydraulic Brake Systems****(Docket No. 70-27; Notice 11)**

This notice responds to petitions for reconsideration of the amendments to 49 CFR 571.105-75, Motor Vehicle Safety Standard No. 105-75, published in the *Federal Register* on February 22, 1974 (39 F.R. 6708). The standard is amended to defer for one year the requirements for a brake fluid level sensor for vehicles with a GVWR over 10,000 pounds, and for two years, a 60-pound maximum baseline pedal effort on vehicles with a GVWR over 15,000 pounds. Slightly increased stopping distances in the third effectiveness test are adopted for one year for certain heavy vehicles at lightly loaded vehicle weight.

Timely petitions for reconsideration of the amendments were received from Girling, Ltd., Wagner Electric Corporation (Wagner), Ford Motor Company (Ford), General Motors Corporation (GM), and Recreational Vehicle Institute, Inc. (RVI). International Harvester Company (Harvester), subsequent to the time allowed for filing petitions for reconsideration, raised certain issues in writing to the Administrator, and its presentation, in accordance with NHTSA regulations, has been considered as a petition for rulemaking. This notice discusses the major issues raised and their resolution.

Effective date: RVI again petitioned for a delayed effective date for recreational vehicles built upon truck and multipurpose passenger vehicles chassis, alleging that time will be needed by final-stage manufacturers for testing and retooling after receipt of the first chassis or vehicle manufactured after the effective date of Standard No. 105-75.

RVI's petition is found to be repetitious of arguments raised previously, and accordingly, pursuant to NHTSA regulations (49 CFR

553.35(c)), has not been granted. The denial of Notice 10 therefore stands, on the grounds set forth in Notice 10 of this docket. In brief, the NHTSA expects a manufacturer of incomplete vehicles to provide final-stage manufacturers, pursuant to 49 CFR 568, with information sufficient to indicate how the final-stage manufacturer may achieve compliance with Standard No. 105-75. Since the effective date of the standard is over a year away, there remains sufficient time for final-stage manufacturers to discuss with manufacturers of incomplete vehicles the kind of information that is to be provided, and to resolve such problems as may appear.

Harvester and Wagner have apprised the NHTSA of unexpected leadtime problems associated with the incorporation of brake fluid indicators into master cylinders of heavy vehicles. The agency has confirmed the seriousness of these problems, and has determined that they derive from factors substantially beyond the control of the affected vehicle manufacturers. It has accordingly concluded that a 1-year delay in the required date for introduction of fluid level sensors for vehicles whose GVWR exceeds 10,000 pounds would be in the public interest.

Harvester also requested a year's delay of the third effectiveness test requirements (S5.1.1.3). It stated that vehicles with 151 inches or less wheelbase and 8,000 pounds or greater GVWR will require anti-lock systems to meet the stopping distance requirements for lightly loaded vehicles, and that suitable anti-lock systems cannot be developed for 1976 model year production. The NHTSA does not consider that a year's delay of the third effectiveness test requirements is in the public interest. It finds, however, on the basis of the information before it that the

incorporation of anti-lock systems into this class of vehicles by the September 1, 1975, effective date is probably impracticable. The standard accordingly is being amended to permit, for a period of 1 year, somewhat longer stopping distance requirements for lightly loaded vehicles of 8,000 pounds or more GVWR. The NHTSA finds these distances to be achievable without anti-lock systems, and that the change for the interim period is justifiable in terms of the costs and the safety benefits involved. As an example, the maximum stopping distance permissible from 60 mph at lightly loaded vehicle weight is changed from 216 feet to 242 feet for vehicles with a GVWR between 8,000 and 10,000 pounds.

Effectiveness requirements. Clarifying words are again added to the effectiveness requirements and test procedures in response to various requests. Heretofore the performance requirements for vehicles with inoperative brake power assist units and brake power units specified four stops at a deceleration figure, with the fifth and final stop specified in feet. This has apparently proved confusing, and the final stop will now be expressed in a manner consistent with the remainder of the performance requirements, as "an average deceleration of not lower than 7 fpsps". This value, however, applies only to passenger cars. Ford argued that the heavy truck stopping distance values are unrealistic, in the optional procedures provided by S5.1.3.2 and S5.1.3.3 for inoperative brake power assist units and brake power units. It petitioned for less stringent values. The agency has considered that Ford's views have merit, and is amending the standard to require a final stop at an average deceleration of not lower than 6 fpsps. Table III has been amended to reflect this change.

Two petitioners contested the pedal force baseline value range of 15 to 60 pounds for the fade and recovery and water recovery demonstrations. GM asked that the minimum be reduced to 10 pounds, while Harvester requested an increase in the maximum to 88 pounds. GM submitted new test data to substantiate its request and its petition is granted; but a floor of 5 pounds is placed on the recovery minimum value. Harvester's petition is predicated on the results of "extensive tests" that show "that no vehicle over 15,000 lbs. GVWR can be brought

into compliance with this requirement for model year 1976." In recognition that even exerting its best efforts Harvester cannot comply by September 1, 1975, the NHTSA has determined that a relaxation of this requirement for two years would be in the public interest. Therefore, Harvester's petition is granted, and between September 1, 1975, and September 1, 1977, the maximum baseline pedal effort will be 90 pounds with a restriction on fade recovery of 100 pounds maximum, and of 110 pounds on water recovery.

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Some petitioners cited an apparent conflict in the previous denial of Toyota's petition to allow an indicator lamp to remain activated when the ignition is returned to "on" after the engine is started, and the fact that some systems do not instantly deactivate. NHTSA has previously noted in the notice of September 2, 1972 (37 F.R. 17970), that no time interval is specified, and that instantaneous deactivation could not be required of continuous sensing units. The indicators considered acceptable to NHTSA are those that may remain activated for a limited time (such as 1 to 10 seconds) after the ignition is returned to "on".

Finally, Wagner petitioned for reinstatement of the limiting phrase "in any reservoir compartment" in the requirement that an indicator lamp be activated whenever there is a drop in the level of brake fluid in a master cylinder reservoir to

less than one-fourth of fluid reservoir capacity. The phrase was deleted in the notice of February 22, 1974, but it should have been retained to clarify that a low level in any reservoir compartment must be indicated. Wagner's petition is granted.

Test conditions. Ford requested an amendment of the test weight condition of S6.1 to clarify how, in the GVWR test condition, added weight is to be distributed, since even at lightly loaded weight on some vehicles the front axle load exceeds its proportional share of the GVWR. The clarification is now provided by adding to S6.1.1 "However, if the weight on any axle at lightly loaded vehicle weight exceeds the axle's proportional share of the gross vehicle weight rating, the load required to reach GVWR is placed so that the weight on that axle remains the same as at lightly loaded vehicle weight."

Ford also asked that S6.2 *Test loads* be revised so that the manufacturer could designate the density of the test load selected, rather than to anticipate values that may be selected from within the prescribed range in the agency's compliance testing program. This petition is denied. Ford's suggestion would result in each manufacturer setting its own unique performance requirements, and would not be appropriate for standards required by law to be uniform for the types of vehicles to which they apply. Each vehicle must comply with the requirements of the standard when loaded with materials of any density within the applicable ranges. This is made clear by the second sentence of S6., *Test conditions*: "Where a range of conditions is specified, the vehicle shall be capable of meeting the requirements at all points within the range."

GM once again petitioned for an amendment of S6.4, *Transmission selector control*, to allow stopping of the test vehicle in gear rather than neutral. Since the agency, pursuant to 49 CFR § 553.35, does not consider repetitious petitions, no action has been taken.

Test procedures and sequence. S7. allows automatic adjusters to be locked out prior to burnish and for the remainder of the test sequence. Girling has petitioned that lockout

should only be in accordance with manufacturer's recommendations. NHTSA agrees and is amending S7. accordingly. At the request of GM the agency has also amended S7. to outline a test procedure for conducting stops when the gear selector is required to be in the neutral position.

Girling also asked that the postburnish brake adjustment test procedure (S7.4.1.2 and S7.4.2.2) be amended to make clear that these sections do not prohibit postburnish adjustment of manually adjustable brakes. Girling is correct, and appropriate amendments are made to reflect the agency's intent.

Ford and Wagner both asked that the burnish procedure of S7.4.2.1.2 be amended in a manner consistent with Motor Vehicle Safety Standard No. 121, to allow brake applications at a point 1.5 miles from the previous brake application for vehicles unable to attain any required speed in 1 mile. The petition is granted, and the standard is amended accordingly.

Finally, Ford suggested that the test procedure for first reburnish, S7.6, be changed to reflect the optional procedure of S7.4.2.1.2, and this request has also been granted.

Other minor amendments have been made to correct printing errors and for internal consistency.

In consideration of the foregoing, 49 CFR 571.105-75, Motor Vehicle Safety Standard No. 105-75, is amended . . .

Effective date: September 1, 1975. Because these amendments relate to a standard that is effective September 1, 1975, it has been determined for good cause shown that an effective date later than 1 year after issuance is in the public interest.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on July 9, 1974.

James B. Gregory
Administrator

39 F.R. 25943
July 15, 1974

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Issued on July 9, 1974.

James B. Gregory
Administrator

39 F.R. 25943
July 15, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75

Hydraulic Brake Systems

(Docket No. 70-27; Notice 13)

This notice amends Standard No. 105-75, *Hydraulic brake systems*, 40 CFR 571.105-75, as it applies to passenger cars, in response to petitions for reconsideration of amendments published July 15, 1974 (39 F.R. 25943) (Notice 11). The amendments defer for one year the requirement for a brake fluid level indicator and modify the permissible pedal force values used in recovery stops.

Manufacturers of hydraulic-braked motor vehicles responded to the Notice 11 amendments of the standard with petitions for reconsideration of specific technical changes in some performance requirements, and also with far-ranging requests for substantial modification, delay, or revocation of the standard. These broad requests are answered in a separate proposal to delay the effective date of the standard for four months in the case of passenger cars, and indefinitely in the case of multipurpose passenger vehicles (MPV's), trucks, and buses. For this reason, only the specific technical elements that necessarily affect passenger cars are addressed in this notice.

Brake fluid level indicator. Chrysler Corporation, Ford Motor Company, General Motors, and Wagner Electric Corporation responded to the 1-year delay in fluid level indicator requirements for heavy vehicles by asserting that procurement and reliability problems also exist for lighter vehicle categories. The NHTSA contacted several manufacturers of brake fluid level indicators and discussed the availability and reliability of their products. It appeared that further field evaluation of available indicators could improve their reliability and that some delay should solve the availability problems which existed. At the February 11 public meeting, American Motors Corporation confirmed that availability problems

still exist for brake fluid level indicators. Consequently, the NHTSA amends the standard to defer requirements for brake fluid level indicators until September 1, 1976.

International Harvester requested clarification in the wording of S5.3.1(b), which appears to require a signal if the amount of brake fluid in a small, nearly full compartment of a split system reservoir does not equal one-quarter of the volume of the larger compartment. The NHTSA agrees that confusion may arise from the present wording, and, without changing the intended meaning of the requirement in any way, amends the wording as requested by Harvester.

Ford requested a clarification of wording in S5.3.1(a), which presently calls for a signal when "any" one of several pressure losses is experienced. Ford correctly notes that the NHTSA use of "any" means that the vehicle or system must be capable of meeting the specified requirement upon the occurrence of every condition listed, and that, in this case, such was not intended. The NHTSA has corrected the wording to make clear that only one of the conditions (at the option of the manufacturer) must be indicated by the brake system indicator lamp.

Maximum and minimum brake pedal force—recovery stops. Chrysler and the Japan Automobile Manufacturers Association (JAMA) supported the Notice 11 reduction of baseline pedal force limits to permit optimization of braking characteristics over the whole range of system operating conditions. Their petitions argued for an additional change to the minimum pedal effort in the first through fourth recovery stops to encourage optimal recovery characteristics. Specifically, Chrysler recommended that the present 15-pound limit (S6.1.13) on minimum

pedal force in the early recovery stops be replaced by a formula tied to the average control force for the baseline check. To avoid oversensitive brakes, a minimum pedal force of five pounds would be required.

The NHTSA concludes that such a requirement would allow greater design freedom in optimizing brake recovery without sacrificing limits on brake sensitivity. Accordingly, the NHTSA reconsiders its action on minimum brake control force requirements, and amends the standard in response to JAMA and Chrysler.

Chrysler also raised the issue of maximum allowable pedal force in the fifth stop of the water recovery requirements. Presently this pedal force can be a maximum of 90 pounds (60 pounds for average control force in the baseline check plus 30 pounds), but this formula requires lower pedal force on a vehicle with lower average baseline pedal force. Chrysler has considered changes in brake lining to lower the wet recovery stop values, but the modifications include major disadvantages such as increased brake imbalance, larger boosters, noise, and wear. The NHTSA finds that the formula can be revised to avoid penalizing good baseline performance, while maintaining a 90-pound maximum effort. Accordingly, S5.1.2.5 is amended to permit a 45-pound increase of pedal effort, as long as the maximum effort does not exceed 90 pounds.

Other requirements of the standard. Wagner requested that the Notice 11 revisions of "in neutral" procedures be made consistent with other provisions of the standard, or that they be replaced with other procedures. The NHTSA finds the present procedure more reproducible than that suggested by Wagner and therefore denies this petition. Wagner correctly pointed out that the procedure to "exceed the test speed by approximately seven mph" may contradict the requirement of testing at speeds only four mph lower than maximum attainable speeds (S5.1). Accordingly, "four to eight mph" is substituted for "approximately seven mph" in S7.

In a related area, JAMA requested that the test procedure for wet brake recovery stops be modified (S7.16.2). The NHTSA did not address these procedures in Notice 11, and does not find that this new subject matter is appropriate for consideration at this time. The JAMA petition will be considered as a petition for rule-making which will be addressed in the near future.

Bendix requested clarification of the Notice 8 preamble discussion of "power assist" and "power" units. Bendix's question arose with regard to its "hydro-boost" unit, which is described as designed with a "push through" capability in both the "normal" and "failed power" operating conditions, and with an accumulator that permits low pedal effort for a limited number of brake applications after a power failure has occurred. The NHTSA concludes that, because the Bendix "hydro-boost" does not prevent the operator from braking the vehicle by an application of muscular force in the "failed power" condition, it qualifies as a brake power assist unit under the definitions of Standard No. 105-75.

Several minor amendments have been made to correct a printing error in Table I as it appeared in Notice 8 (38 F.R. 13017, May 18, 1973) and for consistency in the use of abbreviations and terminology.

In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) is amended. . . .

Effective date: September 1, 1975: Because the amendments relax a requirement and because the present effective date of the standard is September 1, 1975, it is found for good cause shown that an effective date sooner than 180 days following publication of the amendments in the *Federal Register* is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51)

Issued on March 6, 1975.

Noel C. Bufo
Acting Administrator
40 F.R. 11584
March 12, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75

Hydraulic Brake Systems

(Docket No. 70-27; Notice 13)

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still exist for brake fluid level indicators. Consequently, the NHTSA amends the standard to defer requirements for brake fluid level indicators until September 1, 1976.

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pedal force in the early recovery stops be replaced by a formula tied to the average control force for the baseline check. To avoid oversensitive brakes, a minimum pedal force of five pounds would be required.

The NHTSA concludes that such a requirement would allow greater design freedom in optimizing brake recovery without sacrificing limits on brake sensitivity. Accordingly, the NHTSA reconsiders its action on minimum brake control force requirements, and amends the standard in response to JAMA and Chrysler.

Chrysler also raised the issue of maximum allowable pedal force in the fifth stop of the water recovery requirements. Presently this pedal force can be a maximum of 90 pounds (60 pounds for average control force in the baseline check plus 30 pounds), but this formula requires lower pedal force on a vehicle with lower average baseline pedal force. Chrysler has considered changes in brake lining to lower the wet recovery stop values, but the modifications include major disadvantages such as increased brake imbalance, larger boosters, noise, and wear. The NHTSA finds that the formula can be revised to avoid penalizing good baseline performance, while maintaining a 90-pound maximum effort. Accordingly, S5.1.2.5 is amended to permit a 45-pound increase of pedal effort, as long as the maximum effort does not exceed 90 pounds.

Other requirements of the standard. Wagner requested that the Notice 11 revisions of "in neutral" procedures be made consistent with other provisions of the standard, or that they be replaced with other procedures. The NHTSA finds the present procedure more reproducible than that suggested by Wagner and therefore denies this petition. Wagner correctly pointed out that the procedure to "exceed the test speed by approximately seven mph" may contradict the requirement of testing at speeds only four mph lower than maximum attainable speeds (S5.1). Accordingly, "four to eight mph" is substituted for "approximately seven mph" in S7.

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In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) is amended. . . .

Effective date: September 1, 1975: Because the amendments relax a requirement and because the present effective date of the standard is September 1, 1975, it is found for good cause shown that an effective date sooner than 180 days following publication of the amendments in the *Federal Register* is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51)

Issued on March 6, 1975.

Noel C. Bufile
Acting Administrator
40 F.R. 11584
March 12, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75**Hydraulic Brake Systems****(Docket No. 70-27; Notice 14)**

This notice amends Standard No. 105-75, *Hydraulic brake systems*, 49 CFR 571.105-75, to make it applicable only to passenger cars equipped with hydraulic brake systems. This amendment has the effect of withdrawing the standard's applicability to multipurpose passenger vehicles (MPV's), trucks, and buses equipped with hydraulic brake systems.

The National Highway Traffic Safety Administration (NHTSA) proposed a 4-month delay of the standard as it applies to passenger cars and indefinite delay as it applies to other hydraulic-braked vehicles (40 FR 10483, March 6, 1975). Manufacturers responded to the proposed 4-month delay for passenger cars with objections to technical features of the standard, the costs of mid-year changes, and the NHTSA's estimate of the standard's safety benefits. While consideration of these issues continues, a decision has been made to withdraw the standard's applicability to trucks, buses, and MPV's.

The NHTSA proposed withdrawal of the standard because of uncertainty that the particular performance levels established for trucks, MPV's, and buses by Standard No. 105-75 were justified in view of their costs. It is clear that truck braking is in many cases substantially poorer than passenger car braking, and that the generally longer stopping distances and the greater severity of truck accidents justify a safety standard for these vehicles. At the same time, the costs of meeting Standard No. 105-75 in all truck, bus, and MPV model lines are substantial and the NHTSA is not prepared to conclude that they are justified in view of achievable safety benefits.

The Center for Auto Safety (CFAS) questioned the NHTSA's right to propose withdrawal of a promulgated rule in response to manufacturer cost objections without publication of the agency's evaluation of the submitted cost data. As authority, CFAS cites the newly-enacted cost information provisions of the National Traffic and Motor Vehicle Safety Act (15 U.S.C. § 1402).

In this case manufacturers submitted costs for light- to medium-duty trucks that ranged from \$54 to \$775 per unit (depending on model configuration) to attain compliance with the standard. The NHTSA compared these figures with independently-gathered detailed cost and mark-up information and substantiated that the manufacturer's estimates were accurate. This material has been formally compiled as required by the Act and has been made public in the docket (70-27; Notice 12).

CFAS, the Consumers Union, Ms. Susan P. Baker of Johns Hopkins University, the Insurance Institute for Highway Safety, and the Permanente Medical Group stressed the importance of a brake standard for these vehicles. The NHTSA agrees and intends to issue interim requirements for MPV's, trucks, and buses equipped with hydraulic brake systems. However, the NHTSA concludes that the Standard 105-75 requirements in their present form cannot be justified for trucks, buses, and MPV's on the basis of the data available at this time.

In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) is amended . . .

Effective date: September 1, 1975. Because the effective date of the standard for trucks, buses, and MPV's was less than 180 days after the date of publication of this amendment in the

Effective: September 1, 1975

Federal Register, it is found for good cause shown that an effective date less than 180 days from the date of publication is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51).

Issued on April 25, 1975.

James B. Gregory
Administrator

40 F.R. 18411
April 28, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75

Hydraulic Brake Systems

(Docket No. 70-27; Notice 14)

This notice amends Standard No. 105-75, *Hydraulic brake systems*, 49 CFR 571.105-75, to make it applicable only to passenger cars equipped with hydraulic brake systems. This amendment has the effect of withdrawing the standard's applicability to multipurpose passenger vehicles (MPV's), trucks, and buses equipped with hydraulic brake systems.

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In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) is amended

Effective date: September 1, 1975. Because the effective date of the standard for trucks, buses, and MPV's was less than 180 days after the date of publication of this amendment in the

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Issued on April 25, 1975.

James B. Gregory
Administrator

40 F.R. 18411
April 28, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75

Hydraulic Brake Systems

(Docket No. 70-27; Notice 15)

This notice amends Standard No. 105-75, *Hydraulic brake systems*, 49 CFR 571.105-75, to delay its effective date four months from September 1, 1975, to January 1, 1976, and to establish interim control force values for water recovery testing. This notice also amends the present hydraulic brake system standard for passenger cars (Standard No. 105, *Hydraulic brake systems*, (49 CFR 571.105)) to permit compliance with that standard or the new standard at the option of the manufacturer until January 1, 1976.

As issued, Standard No. 105-75 applied to passenger cars, trucks, buses, and multipurpose passenger vehicles (MPV's) equipped with hydraulic brake systems. Its scheduled effective date was September 1, 1975. Thirteen petitions for rulemaking to postpone or revoke the standard were filed with the NHTSA earlier this year. Following a comprehensive evaluation of the petitions, the NHTSA proposed and made final an indefinite delay of the standard as it applied to trucks, buses, and MPV's (40 F.R. 10483, March 6, 1975; 40 F.R. 18411, April 28, 1975).

At the same time, the agency denied petitions for substantial postponement or revocation of the standard as it applies to passenger cars, having considered the cost of compliance for those vehicles, and having determined that significant safety benefit will derive from better stopping performance, stability, and pedal force levels (40 F.R. 10483, March 6, 1975). A discussion of the potential benefits accompanied that decision. An economic evaluation of the impact of the standard will be available in the public docket. The only revisions of the standard proposed by the NHTSA were an interim pedal force value and a 4-month delay of effective date, to permit some flexibility in new model introduction dates where technical

changes or isolated compliance problems had not been resolved.

Manufacturer comments on the proposal were generally unresponsive to the proposed delay of four months and the interim pedal force value of 110 pounds in wet recovery stops. The Vehicle Equipment Safety Commission considered the proposed pedal force values to be overgenerous. Chrysler Corporation indicated its support for the 4-month delay and interim value but emphasized other arguments in its submission. General Motors requested that the pedal force value be made permanent. It appears that manufacturers support the short delay and pedal force modification to simplify introduction of the 1976 models. Accordingly, the standard is modified as proposed, to establish an amended effective date of January 1, 1976, and a pedal force increase of 60 pounds up to a total of 110 pounds (in S5.1.5.2) until September 1, 1976.

The majority of comments restated manufacturer positions on the issue of substantial delay or revocation of the standard for passenger cars. The NHTSA has already considered this issue and, as noted above, concluded that the benefits of improved stopping performance, stability, and pedal force values outweigh the costs of implementation. Manufacturers submitted no new data that would justify a reversal of NHTSA's earlier decision.

Although the NHTSA limited its proposal to a choice between the effective dates of September 1, 1975, and January 1, 1976, several manufacturers compared the cost savings of a short delay to January 1, 1976, with a substantially longer delay to September 1, 1976. Actually, the January 1 date was proposed in order to ease the introduction of new models after September 1,

1975, and was not proposed as a means of reducing costs. The proposal was largely in response to manufacturers' comments that some 1976 models would be introduced substantially later than normal so that 1975 model production might be extended beyond September 1, 1975. The NHTSA believes that the three years of lead-time since promulgation of Standard No. 105-75 have been sufficient to permit the design and testing of complying brake systems in nearly all cases. With the 4-month transitional period, a manufacturer will be free to introduce the new brake systems along with its new model introduction, as dictated by the economic situation of the automotive industry.

Ford and Chrysler suggested that the standard could be improved by reduced loading during brake fade testing. These companies argue that present-day brake balance must be modified to meet the brake-fade and fourth effectiveness test of Standard No. 105-75 and that the new balance is not optimum. Agency testing demonstrates that many present-day vehicles can in fact meet the requirements as their brakes are balanced and suggests that major departures from current brake balance design will generally not be re-

quired to comply with fade requirements under the present test conditions. The NHTSA accordingly concludes that the presently-specified loading does not result in characteristics which would justify delay of the standard and the consequent loss of benefits during the period of delay.

In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) is amended. . . .

Effective date: The date on which Standard No. 105-75 becomes mandatory for all passenger cars is January 1, 1976. However, the effective date of the amendments to both Standard No. 105-75 and Standard No. 105 is June 9, 1975, and passenger cars manufactured between that date and January 1, 1976, may conform to either standard at the discretion of the manufacturer.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51.)

Issued on June 5, 1975.

James B. Gregory
Administrator

40 F.R. 24525
June 9, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75**Hydraulic Brake Systems****(Docket No. 70-27; Notice 15)**

This notice amends Standard No. 105-75, *Hydraulic brake systems*, 49 CFR 571.105-75, to delay its effective date four months from September 1, 1975, to January 1, 1976, and to establish interim control force values for water recovery testing. This notice also amends the present hydraulic brake system standard for passenger cars (Standard No. 105, *Hydraulic brake systems*, (49 CFR 571.105)) to permit compliance with that standard or the new standard at the option of the manufacturer until January 1, 1976.

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Issued on June 5, 1975.

James B. Gregory
Administrator

40 F.R. 24525
June 9, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75**Hydraulic Brake Systems****(Docket No. 70-27; Notice 16)**

This notice responds to three petitions for reconsideration of recent amendments of Standard No. 105-75, *Hydraulic brake systems*, 49 CFR 571.105-75 (40 F.R. 11584, March 12, 1975) (Notice 13). The petitions requested clarification of new language that specifies minimum control force application values (S5.1.4.3(a)(2) and S5.1.5.2(a)(2)) and objected to the NHTSA decision to defer for 1 year the requirement for a brake fluid level indicator in passenger cars.

Wagner Electric Corporation requested clarification of the description of minimum permissible control force application value, which reads, "A minimum of 10 pounds or 40 percent (whichever is greater) less than the average control force for the baseline check (but in no case less than 5 pounds)." Starting with a baseline value, the manufacturer must utilize the lower of two values which result when different amounts are subtracted from the baseline value. Because there is some ambiguity in the language used to describe these calculations, the NHTSA hereby revises the language to improve its clarity. The new wording in no way modifies the meaning of S5.1.4.3(a)(2) and S5.1.5.2(a)(2).

Ford Motor Company, Wagner, and Mercedes-Benz requested reconsideration of the decision to defer for 1 year the requirement of S5.3.1(b) that specifies a brake fluid level indicator. Ford and Wagner requested that the indicator be permanently deleted from the requirements in view of expense and reliability problems, claiming that its function is adequately served by the pressure differential warning that is also required by the standard.

The fluid level indicator detects and signals a loss of fluid from the system, whether the loss is swift or gradual. In the event of such a dan-

gerous condition, the vehicle operator is warned early that braking function will be lost in the future. Unlike the pressure differential indicator, the fluid level indicator warns the operator before one subsystem is effectively depleted of all fluid, and permits a repair to be undertaken before braking is lost. The indicator would also signal leakage at a wheel cylinder which could contaminate brake linings and create a side-to-side imbalance in braking.

At the same time, the petitions raise questions about the reliability, availability, and cost of these devices that cannot be answered without further data. The NHTSA is in the process of gathering these data, and for this reason is unable to respond to these two petitions within the 120-day period established for actions on petitions for reconsideration. The NHTSA anticipates publication of its response no later than October 31, 1975.

Mercedes-Benz argued that the 1-year deferral of the brake fluid level indicator discriminated against those manufacturers who presently provide such a device to meet the present Standard No. 105 (49 CFR 571.105). As interpreted, Standard No. 105 specifies a pressure differential indicator (used by most manufacturers) or a fluid level indicator (used by Mercedes) to signal a complete hydraulic-type failure of a partial system. Mercedes asked that the new standard be modified to continue this manufacturer option until both systems are required, reasoning that either system provides an equal safety benefit.

As noted in the earlier discussion, a review of the benefits found in one warning indicator that are not found in the other demonstrates that there are separate and significant benefits in each warning. The new hydraulic brake standard

specifies both warnings for this reason. The fluid level indicator was deferred only because of unresolved reliability and availability issues. The pressure differential indicator is a proven and available device which can be incorporated in vehicles at reasonable cost. While the NHTSA does not wish to encourage removal of Mercedes' fluid level indicator, it has decided that all passenger cars should be equipped with the pressure differential indicator. For these reasons, Mercedes' petition is denied.

In an area unrelated to the rulemaking which underlies this response to petitions for reconsideration, Toyota Motor Sales, Inc., has requested confirmation that S5.3.2 of the standard requires a check of the brake system indicator lamp function only when the transmission shift lever is in the "P" (park) or "N" (neutral) position (in the case of vehicles with automatic transmission). The literal wording of S5.3.2 requires a check of lamp function without regard to the position of the transmission shift lever, whenever the ignition switch is turned to the "on" position when the engine is not running, or when the ignition switch is in a position between "on" and "start" that is designated by the manufacturer as a check position. In the case of vehicles with an automatic transmission, however, this wording does not reflect the NHTSA's intent with

respect to the check function. To properly reflect this intent, the language of S5.3.2 is hereby modified in accordance with Toyota's request. This is an interpretative ruling, adding no additional burden on any person, concerning which the NHTSA finds that notice and opportunity for comment are unnecessary, under provisions of the Administrative Procedures Act (5 U.S.C. § 553(b)(3)(A)).

In a separate area, the date of September 1, 1975, appearing in S7.4.2.1 of the standard is changed to January 1, 1976, to conform to the standard's new effective date.

In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) is amended...

Effective date: September 17, 1975. Because this amendment relieves a restriction and imposes no additional burden on any person, it is found for good cause shown that an immediate effective date is in the public interest.

(Sec. 103, 119 Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51.)

Issued on September 11, 1975.

James B. Gregory
Administrator

40 F.R. 42872
September 17, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75**Hydraulic Brake Systems****(Docket No. 70-27; Notice 16)**

This notice responds to three petitions for reconsideration of recent amendments of Standard No. 105-75, *Hydraulic brake systems*, 49 CFR 571.105-75 (40 F.R. 11584, March 12, 1975) (Notice 13). The petitions requested clarification of new language that specifies minimum control force application values (S5.1.4.3(a)(2) and S5.1.5.2(a)(2)) and objected to the NHTSA decision to defer for 1 year the requirement for a brake fluid level indicator in passenger cars.

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At the same time, the petitions raise questions about the reliability, availability, and cost of these devices that cannot be answered without further data. The NHTSA is in the process of gathering these data, and for this reason is unable to respond to these two petitions within the 120-day period established for actions on petitions for reconsideration. The NHTSA anticipates publication of its response no later than October 31, 1975.

Mercedes-Benz argued that the 1-year deferral of the brake fluid level indicator discriminated against those manufacturers who presently provide such a device to meet the present Standard No. 105 (49 CFR 571.105). As interpreted, Standard No. 105 specifies a pressure differential indicator (used by most manufacturers) or a fluid level indicator (used by Mercedes) to signal a complete hydraulic-type failure of a partial system. Mercedes asked that the new standard be modified to continue this manufacturer option until both systems are required, reasoning that either system provides an equal safety benefit.

As noted in the earlier discussion, a review of the benefits found in one warning indicator that are not found in the other demonstrates that there are separate and significant benefits in each warning. The new hydraulic brake standard

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respect to the check function. To properly reflect this intent, the language of S5.3.2 is hereby modified in accordance with Toyota's request. This is an interpretative ruling, adding no additional burden on any person, concerning which the NHTSA finds that notice and opportunity for comment are unnecessary, under provisions of the Administrative Procedures Act (5 U.S.C. § 553(b)(3)(A)).

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Effective date: September 17, 1975. Because this amendment relieves a restriction and imposes no additional burden on any person, it is found for good cause shown that an immediate effective date is in the public interest.

(Sec. 103, 119 Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51.)

Issued on September 11, 1975.

James B. Gregory
Administrator

40 F.R. 42872
September 17, 1975

MOTOR VEHICLE SAFETY STANDARD NO. 105

Hydraulic Brake Systems

S1. Scope. This standard specifies requirements for hydraulic service brake and associated parking brake systems.

S2. Purpose. The purpose of this standard is to insure safe braking performance under normal and emergency conditions.

[S3. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses with hydraulic service brake systems. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)]

S4. Definitions. "Antilock system" means a portion of a service brake system that automatically controls the degree of rotational wheel slip at one or more road wheels of the vehicle during braking.

"Backup system" means a portion of a service brake system, such as a pump, that supplies energy in the event of a primary brake power source failure.

"Brake power assist unit" means a device installed in a hydraulic brake system that reduces the operator effort required to actuate the system, and that if inoperative does not prevent the operator from braking the vehicle by a continued application of muscular force on the service brake control.

"Brake power unit" means a device installed in a brake system that provides the energy required to actuate the brakes, either directly or indirectly through an auxiliary device, with the operator action consisting only of modulating the energy application level.

"Hydraulic brake system" means a system that uses hydraulic fluid as a medium for transmitting

force from a service brake control to the service brake, and that may incorporate a brake power assist unit, or a brake power unit.

"Initial brake temperature" means the average temperature of the service brakes on the hottest axle of the vehicle 0.2 miles before any brake application.

["Lightly loaded vehicle weight" means:

(a) for vehicles with a GVWR of 10,000 pounds or less, unloaded vehicle weight plus 400 pounds (including driver and instrumentation);

(b) for vehicles with a GVWR greater than 10,000 pounds, unloaded vehicle weight plus 500 pounds (including driver and instrumentation). (46 F.R. 55—January 2, 1981. Effective: 9/1/83)]

"Parking mechanism" means a component or subsystem of the drive train that locks the drive train when the transmission control is placed in a parking or other gear position and the ignition key is removed.

"Pressure component" means a brake system component that contains the brake system fluid and controls or senses the fluid pressure.

"Skid number" means the frictional resistance of a pavement measured in accordance with American Society for Testing and Materials (ASTM) Method E-274-70 (as revised July, 1974) at 40 mph, omitting water delivery as specified in paragraphs 7.1 and 7.2 of that method.

"Snub" means the braking deceleration of a vehicle from a higher reference speed to a lower reference speed that is greater than zero.

"Spike stop" means a stop resulting from the application of 200 pounds of force on the service brake control in 0.08 second.

“Split service brake system” means a brake system consisting of two or more subsystems actuated by a single control designed so that a leakage-type failure of a pressure component in a single subsystem (except structural failure of a housing that is common to two or more subsystems) shall not impair the operation of any other subsystem.

“Stopping distance” means the distance traveled by a vehicle from the point of application of force to the brake control to the point at which the vehicle reaches a full stop.

“Variable proportioning brake system” means a system that automatically adjusts the braking force at the axles to compensate for vehicle static axle loading and/or dynamic weight transfer between axles during deceleration.

S5. Requirements.

[S5.1 Service brake systems. Each passenger car and each multipurpose passenger vehicle, truck, and bus with a GVWR of 10,000 lbs. or less, and each school bus with a GVWR of greater than 10,000 lbs. shall be capable of meeting the requirements of S5.1.1 through S5.1.6 under the conditions prescribed in S6, when tested according to the procedures and in the sequence set forth in S7. Each multipurpose passenger vehicle, truck, and bus (other than a school bus) with a GVWR greater than 10,000 lbs. shall meet the requirements of S5.1.2 and S5.1.3 under the conditions specified in S6 when tested according to the procedures and in the sequence set forth in S7. Except as noted in S5.1.1.2 and S5.1.1.4, if a vehicle is incapable of attaining a speed specified in S5.1.1, S5.1.2, S5.1.3, or S5.1.6, its service brakes shall be capable of stopping the vehicle from the multiple of 5 mph that is 4 to 8 mph less than the speed attainable in 2 miles, within distances that do not exceed the corresponding distances specified in Table II. If a vehicle is incapable of attaining a speed specified in S5.1.4 in the time or distance interval set forth, it shall be tested at the highest speed attainable in the time or distance interval specified. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)]

[S5.1.1 Stopping distance. The service brakes shall be capable of stopping each vehicle, other than a vehicle which both has a GVWR of not less than 8,000 pounds and not greater than 10,000 pounds and is not a school bus, in four effec-

tiveness tests within the distances and from the speeds specified in S5.1.1.1, S5.1.1.2, S5.1.1.3, and S5.1.1.4. The service brakes shall be capable of stopping each vehicle which both has a GVWR of not less than 8,000 pounds and not greater than 10,000 pounds and is not a school bus, in three effectiveness tests within the distances and from the speeds specified in S5.1.1.1, S5.1.1.2, and S5.1.1.4. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)]

S5.1.1.1 In the first (preburnished) effectiveness test, the vehicle shall be capable of stopping from 30 mph and 60 mph within the corresponding distances specified in Column I of Table II.

[S5.1.1.2 In the second effectiveness test, the vehicle shall be capable of stopping from 30 and 60 mph within the corresponding distances specified in Column II of Table II. If the speed attainable in 2 miles is not less than 84 mph, a passenger car or other vehicle with a GVWR of 10,000 pounds or less shall also be capable of stopping from 80 mph within the corresponding distances specified in Column II of Table II. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)]

S5.1.1.3 In the third effectiveness test the vehicle shall be capable of stopping at lightly loaded vehicle weight from 60 mph within the corresponding distance specified in Column III of Table II.

S5.1.1.4 In the fourth effectiveness test, a vehicle with a GVWR of 10,000 pounds or less shall be capable of stopping from 30 and 60 mph within the corresponding distances specified in Column I of Table II. If the speed attainable in 2 miles is not less than 84 mph, a passenger car [or other vehicle with a GVWR of 10,000 lbs. or less] shall also be capable of stopping from 80 mph within the corresponding distance specified in Column I of Table II. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)

If the speed attainable in 2 miles is not less than 99 mph, a passenger car shall, in addition, be capable of stopping from the applicable speed indicated below, within the corresponding distance specified in Column I of Table II.

| <i>Speed attainable in 2 miles (mph)</i> | <i>Required to stop from (mph)</i> |
|--|--|
| not less than 99 but less than 104 | 95 |
| 104 or more | 100 |

TABLE I—BRAKE TEST PROCEDURE SEQUENCE AND REQUIREMENTS

| No. | Sequence | Test Load | | Test Procedure | Requirements |
|-----|--|-----------|------|----------------|--------------|
| | | Light | GVWR | | |
| 1. | Instrumentation check | - | - | S7.2 | - |
| 2. | First (preburnish) effectiveness test | - | x | S7.3 | S5.1.1.1 |
| 3. | Burnish procedure | - | x | S7.4 | - |
| 4. | Second effectiveness | - | x | S7.5 | S5.1.1.2 |
| 5. | First reburnish | - | x | S7.6 | - |
| 6. | Parking brake | x | x | S7.7 | S5.2 |
| 7. | Third effectiveness (lightly loaded vehicle) | x | - | S7.8 | S5.1.1.3 |
| 8. | Partial failure | x | x | S7.9 | S5.1.2 |
| 9. | Inoperative brake power and power assist units | - | x | S7.10 | S5.1.3 |
| 10. | First fade and recovery | - | x | S7.11 | S5.1.4 |
| 11. | Second reburnish | - | x | S7.12 | - |
| 12. | Second fade and recovery | - | x | S7.13 | S5.1.4 |
| 13. | Third reburnish | - | x | S7.14 | - |
| 14. | Fourth effectiveness | - | x | S7.15 | S5.1.1.4 |
| 15. | Water recovery | - | x | S7.16 | S5.1.5 |
| 16. | Spike stops | - | x | S7.17 | S5.1.6 |
| 17. | Final inspection | - | - | S7.18 | S5.6 |
| 18. | Moving barrier test | - | x | S7.19 | S5.2.2.3 |

S5.1.2 Partial failure.

S5.1.2.1 In vehicles manufactured with a split service brake system, in the event of a rupture or leakage type of failure in a single subsystem, other than a structural failure of a housing that is common to two or more subsystems, the remaining portion(s) of the service brake system shall continue to operate and shall be capable of stopping a vehicle from 60 mph within the corresponding distance specified in Column IV of Table II.

S5.1.2.2 In vehicles not manufactured with a split service brake system, in the event of any one rupture or leakage type of failure in any component of the service brake system the vehicle shall, by operation of the service brake control, be capable of stopping 10 times consecutively from 60 mph within the corresponding distance specified in Column IV of Table II.

[S5.1.3 Inoperative brake power assist unit or brake power unit. A vehicle equipped with one or more brake power assist units shall meet the requirements of either S5.1.3.1, S5.1.3.2, or S5.1.3.4 (chosen at the option of the manufacturer), and a vehicle equipped with one or more brake power units shall meet the requirements of either S5.1.3.1, S5.1.3.3, or S5.1.3.4 (chosen at the option

of the manufacturer). (46 F.R. 55—January 2, 1981. Effective: 9/1/83)]

S5.1.3.1 The service brakes on a vehicle equipped with one or more brake power assist units or brake power units, with one such unit inoperative and depleted of all reserve capability, shall be capable of stopping a vehicle from 60 mph within the corresponding distance specified in Column IV of Table II.

S5.1.3.2 Brake power assist units. The service brakes on a vehicle equipped with one or more brake power assist units, with one such unit inoperative, shall be capable of stopping a vehicle from 60 mph—

(a) In six consecutive stops at an average deceleration for each stop that is not lower than that specified in Column I of Table III, when the inoperative unit is not initially depleted of all reserve capability; and

[(b) In a final stop, at an average deceleration that is not lower than 7 fpsps for passenger cars (equivalent stopping distance 554 feet) or 6 fpsps for vehicles other than passenger cars (equivalent stopping distance 646 feet), as applicable, when the inoperative unit is depleted of all reserve capac-

TABLE II—STOPPING DISTANCES

| STOPPING DISTANCE IN FEET FOR TESTS INDICATED | | | | | | | | | | | | | | |
|---|---|------------------|---|------------------|------------------|------------------|------------------|---|------------------|------------------|------------------|--|------------------|------------------|
| Vehicle test speed (miles per hour) | I | | | | II | | | III | | | | IV | | |
| | 1st (preburnish) and 4th effectiveness: spike effectiveness check | | | | 2d effectiveness | | | 3d (lightly loaded vehicle) effectiveness | | | | Inoperative brake power and power assist unit; partial failure | | |
| | (a) | (b) | (c) | (d) | (a) | (b) and (c) | (d) | (a) | (b) | (c) | (d) | (a) | (b) and (c) | (d) |
| 30 | ¹ 57 | ¹ 65 | ^{1 2} 69(1st) ^{1 2} 65(4th and spike) ¹ 72 | ¹ 88 | ¹ 54 | ¹ 57 | ¹ 81 | 51 | 57 | 65 | 81 | 114 | 130 | 170 |
| 35 | 74 | 83 | 91 | 132 | 70 | 74 | 132 | 67 | 74 | 83 | 132 | 155 | 176 | 225 |
| 40 | 96 | 108 | 119 | 173 | 91 | 96 | 173 | 87 | 96 | 108 | 173 | 202 | 229 | 288 |
| 45 | 121 | 137 | 150 | 218 | 115 | 121 | 218 | 110 | 121 | 137 | 218 | 257 | 291 | 358 |
| 50 | 150 | 169 | 185 | 264 | 142 | 150 | 264 | 135 | 150 | 169 | 264 | 317 | 359 | 435 |
| 55 | 181 | 204 | 224 | 326 | 172 | 181 | 326 | 163 | 181 | 204 | 326 | 383 | 433 | 530 |
| 60 | ¹ 216 | ¹ 242 | ¹ 267 | ¹ 388 | ¹ 204 | ¹ 216 | ¹ 388 | ¹ 194 | ¹ 216 | ¹ 242 | ¹ 388 | ¹ 456 | ¹ 517 | ¹ 613 |
| 80 | ¹ 405 | ¹ 459 | ¹ 510 | NA | ¹ 383 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 95 | ¹ 607 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 100 | ¹ 673 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

¹ Distances for specified. ² Applicable to school buses only. NA = Not applicable.

NOTE—(a) passenger cars; (b) vehicles other than passenger cars with GVWR of less than 8,000 lbs.; (c) vehicles with GVWR of not less than 8,000 lbs. and not more than 10,000 lbs.; (d) vehicles with GVWR greater than 10,000 lbs. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)】

TABLE III—INOPERATIVE BRAKE POWER ASSIST AND BRAKE POWER UNITS

| Stop. No. | Average Deceleration, FPS ² | | | | Equivalent Stopping Distance, Feet | | | |
|-----------|--|------------------|---------------------------|------------------|------------------------------------|-------------|---------------------------|-------------|
| | Column 1—brake power assist | | Column 2—brake power unit | | Column 3—brake power assist | | Column 4—brake power unit | |
| | (a) | (b) and (c) | (a) | (b) and (c) | (a) | (b) and (c) | (a) | (b) and (c) |
| 1 | 16.0 | 14.0 | 16.0 | 13.0 | 242 | 277 | 242 | 298 |
| 2 | 12.0 | 12.0 | 13.0 | 11.0 | 323 | 323 | 298 | 352 |
| 3 | 10.0 | 10.0 | 12.0 | 10.0 | 388 | 388 | 323 | 388 |
| 4 | 9.0 | 8.5 | 11.0 | 9.5 | 431 | 456 | 352 | 409 |
| 5 | 8.0 | 7.5 | 10.0 | 9.0 | 484 | 517 | 388 | 431 |
| 6 | 7.5 | 6.7 | 9.5 | 8.5 | 517 | 580 | 409 | 456 |
| 7 | ¹ 7.0 | ¹ 6.0 | 9.0 | 8.0 | 554 | 646 | 431 | 484 |
| 8 | NA | NA | 8.5 | 7.5 | NA | NA | 456 | 517 |
| 9 | NA | NA | 8.0 | 7.0 | NA | NA | 484 | 554 |
| 10 | NA | NA | 7.5 | 6.5 | NA | NA | 517 | 596 |
| 11 | NA | NA | ¹ 7.0 | ¹ 6.0 | NA | NA | 554 | 646 |

¹ Depleted. (a) passenger cars; (b) vehicles other than passenger cars with GVWR of 10,000 lbs. or less; (c) vehicles with GVWR greater than 10,000 lbs.; NA = Not Applicable. (46 F.R. 55—January 29, 1981. Effective: 9/1/83)】

ity. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)]

S5.1.3.3 Brake power units. The service brakes of a vehicle equipped with one or more brake power units with an accumulator-type reserve system, with any one failure in any one unit, shall be capable of stopping the vehicle from 60 mph:

(a) In 10 consecutive stops at an average deceleration for each stop that is not lower than that specified in Column II of Table III, when the unit is not initially depleted of all reserve capability; and

[(b) In a final stop, at an average deceleration that is not lower than 7 fpsps for passenger cars (equivalent stopping distance 554 feet) or 6 fpsps for vehicles other than passenger cars (equivalent stopping distance 646 feet), as applicable, when the inoperative unit is depleted of all reserve capacity. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)]

S5.1.3.4 Brake power assist and brake power units. The service brake of a vehicle equipped with one or more brake power assist units or brake power units with a backup system, with one brake power assist unit or brake power unit inoperative and depleted of all reserve capability and with only the backup system operating in the failed subsystem, shall be capable of stopping the vehicle from 60 mph in 15 consecutive stops at an average deceleration for each stop that is not lower than 12 fpsps (equivalent stopping distance 323 feet).

S5.1.4 Fade and recovery. The service brakes shall be capable of stopping each vehicle in two fade and recovery tests as specified below.

S5.1.4.1 The control force used for the base line check stops or snubs shall be not less than 10 pounds, nor more than 60 pounds, except that the control force for a vehicle with a GVWR of 10,000 pounds or more may be between 10 pounds and 90 pounds.

S5.1.4.2 (a) Each vehicle with GVWR of 10,000 pounds or less shall be capable of making five fade stops (10 fade stops on the second test) from 60 mph at a deceleration not lower than 15 fpsps for each stop, followed by five fade stops at the maximum deceleration attainable from 5 to 15 fpsps.

(b) Each vehicle with a GVWR greater than 10,000 pounds shall be capable of making 10 fade

snubs (20 fade snubs on the second test) from 40 mph to 20 mph at 10 fpsps for each snub.

S5.1.4.3 (a) Each vehicle with a GVWR of 10,000 pounds or less shall be capable of making five recovery stops from 30 mph at ten fpsps for each stop, with a control force application that falls within the following maximum and minimum limits:

(1) A maximum for the first four recovery stops of 150 pounds, and for the fifth stop, of 20 pounds more than the average control force for the baseline check; and

(2) A minimum of—

(A) The average control force for the baseline check minus 10 pounds, or

(B) The average control force for the baseline check times 0.60,

whichever result is lower (but in no case lower than 5 pounds).

(b) Each vehicle with a GVWR of more than 10,000 pounds shall be capable of making five recovery snubs from 40 mph to 20 mph at 10 fpsps of each snub, with a control force application that falls within the following maximum and minimum limits:

(1) A maximum for the first four recovery snubs of 150 pounds, and for the fifth snub, of 20 pounds more than the average control force for the baseline check (but in no case more than 100 pounds); and

(2) A minimum of—

(A) The average control force for the baseline check minus 10 pounds, or

(B) The average control force for the baseline check times 0.60, whichever is lower (but in no case lower than 5 pounds).

S5.1.5 Water recovery. The service brakes shall be capable of stopping each vehicle in a water recovery test, as specified below.

S5.1.5.1 The control force used for the baseline check stops or snubs shall be not less than 10 pounds, nor more than 60 pounds, except that the control force for a vehicle with a GVWR of 10,000 pounds or more may be between 10 and 90 pounds.

S5.1.5.2 (a) After being driven for 2 minutes at a speed of 5 mph in any combination of forward and reverse directions through a trough having a water depth of 6 inches, each vehicle with a GVWR of 10,000 pounds or less shall be

(b) If a single common indicator is used, the lamp shall display the word "Brake". The letters and background of a single common indicator shall be of contrasting colors, one of which is red.

(c) (1) If separate indicator lamps are used for one or more than one of the functions described in S5.3.1(a) through S5.3.1(d), the display shall, except as provided in (c)(1)(A) through (D) of this section, include the word "Brake" and appropriate additional labeling.

(A) If a separate indicator lamp is provided for gross loss of pressure, the words "Brake Pressure" shall be used for S5.3.1(a).

(B) If a separate indicator lamp is provided for low brake fluid, the words "Brake Fluid" shall be used for S5.3.1(b), except for vehicles using hydraulic system mineral oil.

(C) If a separate indicator lamp is provided for an anti-lock system, the single word "Antilock" or "Anti-lock" may be used for S5.3.1(c).

(D) If a separate indicator lamp is provided for application of the parking brake, the single word "Park" may be used for S5.3.1(d).

(2) Except for a separate indicator lamp for an anti-lock system, the letters and background of each separate indicator lamp shall be of contrasting colors, one of which is red. The letters and background of a separate indicator lamp for an anti-lock system shall be of contrasting colors, one of which is yellow. (49 F.R. 30191-July 27, 1984. Effective: July 27, 1984)]

S5.4 Reservoirs.

S5.4.1 Master cylinder reservoirs. A master cylinder shall have a reservoir compartment for each service brake subsystem serviced by the master cylinder. Loss of fluid from one compartment shall not result in a complete loss of brake fluid from another compartment.

S5.4.2 Reservoir capacity. Reservoirs, whether for master cylinders or other type systems, shall have a total minimum capacity equivalent to the fluid displacement resulting when all the wheel cylinders or caliper pistons serviced by the reservoirs move from a new lining, fully retracted position (as adjusted initially to the manufacturer's recommended setting) to a fully worn, fully applied position, as determined in accordance with S7.18(c) of this standard. Reservoirs shall have completely separate compartments for each subsystem except that in reservoir systems utilizing a portion of the reservoir for a common supply to two or more subsystems, individual partial compartments shall each have a minimum volume of fluid equal to at least the volume displaced by the

master cylinder piston servicing the subsystem, during a full stroke of the piston. Each brake power unit reservoir servicing only the brake system shall have a minimum capacity equivalent to the fluid displacement required to charge the system piston(s) or accumulator(s) to normal operating pressure plus the displacement resulting when all the wheel cylinders or caliper pistons serviced by the reservoir or accumulator(s) move from a new lining fully retracted position (as adjusted initially to the manufacturer's recommended setting) to a fully worn, fully applied position.

S5.4.3 Reservoir labeling. Each vehicle shall have a brake fluid warning statement that reads as follows, in letters at least $\frac{1}{8}$ of an inch high: "WARNING, Clean filler cap before removing."

Use only _____ fluid from a sealed container." (Inserting the recommended type of brake fluid as specified in 49 CFR § 571.116, e.g., "DOT 3".) The lettering shall be—

(a) Permanently affixed, engraved, or embossed;

(b) Located so as to be visible by direct view, either on or within 4 inches of the brake fluid reservoir filler plug or cap; and

(c) Of a color that contrasts with its background, if it is not engraved or embossed.

S5.5 Antilock and variable proportioning brake systems. In the event of failure (structural or functional) in an antilock or variable proportioning brake system the vehicle shall be capable of meeting the stopping distance requirements specified in S5.1.2 for service brake system partial failure.

S5.6 Brake system integrity. Each vehicle shall be capable of completing all performance requirements of S5 without—

(a) Detachment or fracture of any component of the braking system, such as brake springs and brake shoe or disc pad facing, other than minor cracks that do not impair attachment of the friction facing. All mechanical components of the braking system shall be intact and functional. Friction facing tearout (complete detachment of lining) shall not exceed 10 percent of the lining on any single frictional element.

(b) Any visible brake fluid or lubricant on the friction surface of the brake, or leakage at the master cylinder or brake power unit reservoir cover, seal, and filler openings.

S6. Test conditions. The performance requirements of S5 shall be met under the following conditions. Where a range of conditions is specified, the vehicle shall be capable of meeting the requirements at all points within the range.

S6.1 Vehicle weight.

S6.1.1 Other than tests specified at lightly loaded vehicle weight in S7.7, S7.8, and S7.9, the vehicle is loaded to its GVWR such that the weight on each axle as measured at the tireground interface is in proportion to its GAWR, except that [each] fuel tank is filled to any level from 100 percent of capacity (corresponding to full GVWR loading) to 75 percent. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)

However, if the weight on any axle of a vehicle at lightly loaded vehicle weight exceeds the axle's proportional share of the gross vehicle weight rating, the load required to reach GVWR is placed so that the weight on that axle remains the same as at lightly loaded vehicle weight.

S6.1.2 For the applicable tests specified in S7.7, S7.8, and S7.9, vehicle weight is lightly loaded vehicle weight, with the added weight distributed in the front passenger seat area in passenger cars [multipurpose vehicles and trucks] and in the area adjacent to the driver's seat in buses. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)

S6.2 Test loads. Reserved.

S6.3 Tire inflation pressure. Tire inflation pressure is the pressure recommended by the vehicle manufacturer for the GVWR of the vehicle.

S6.4 Transmission selector control. For S7.3, S7.5, S7.8, S7.15, S7.17, S7.11.1.2, S7.11.2.2, S7.11.3.2, and as required for S7.13, the transmission selector control is in neutral for all decelerations. For all other tests during all decelerations, the transmission selector is in the control position, other than overdrive, recommended by the manufacturer for driving on a level surface at the applicable test speed. To avoid engine stall during tests required to be run in gear a manual transmission may be shifted to neutral (or the clutch disengaged) when the vehicle speed decreases to 20 mph.

S6.5 Engine. Engine idle speed and ignition timing settings are according to the manufacturer's recommendations. If the vehicle is equipped with an adjustable engine speed governor, it is adjusted according to the manufacturer's recommendation.

S6.6 Vehicle openings. All vehicle openings (doors, windows, hood, trunk, convertible top, cargo doors, etc.) are closed except as required for instrumentation purposes.

S6.7 Ambient temperature. The ambient temperature is any temperature between 32° F. and 100° F.

S6.8 Wind velocity. The wind velocity is zero.

S6.9 Road surface. Road tests are conducted on a 12-foot-wide, level roadway having a skid number of 81. Burnish stops are conducted on any surface. The parking brake test surface is clean, dry smooth Portland cement concrete.

S6.10 Vehicle position. The vehicle is aligned in the center of the roadway at the start of each brake application. Stops, other than spike stops, are made without any part of the vehicle leaving the roadway. Except as noted below, stops are made without lockup of any wheel at speeds greater than 10 mph. There may be controlled lockup on an antilock-equipped axle, and lockup of not more than one wheel per vehicle, uncontrolled by an antilock system. [Dual wheels on one side of an axle are considered a single wheel.] Locked wheels at speeds greater than 10 mph are allowed during spike stops (but not spike check stops), partial failure stops, and inoperative brake power or power assist unit stops. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)

S6.11 Thermocouples. The brake temperature is measured by plug-type thermocouples installed in the approximate center of the facing length and width of the most heavily loaded shoe or disc pad, one per brake, as shown in Figure 1. A second thermocouple may be installed at the beginning of the test sequence if the lining wear is expected to reach a point causing the first thermocouple to contact the metal rubbing surface of a drum or rotor. For center-grooved shoes or pads, thermocouples are installed within one-eighth of an inch to one-quarter inch of the groove and as close to the center as possible.



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S7.4.1.2 Brake adjustment—post burnish. After burnishing, adjust the brakes manually in accordance with the manufacturer's recommendation if the brake systems are manual or if the automatic adjusters are locked out, or by making stops as recommended by the manufacturer if the automatic adjusters are operative.

S7.4.2 Vehicles with GVWR greater than 10,000 pounds.

S7.4.2.1 Burnish. Burnish the brakes by making 500 snubs at 10 fpsps in the sequence specified in Table IV and within the speed ranges indicated. After each brake application accelerate to the next speed specified and maintain that speed until making the next brake application at a point 1 mile from the initial point of the previous brake application. If a vehicle cannot attain any speed specified in 1 mile, continue to accelerate until the speed specified is reached or until a point 1.5 miles from the initial point of the previous brake application is reached, whichever occurs first. If during any of the brake applications specified in Table IV the hottest brake reaches 500° F, make the remainder of the 500 applications from that snub condition, except that a higher or lower snub condition shall be followed (up to the 60 mph initial speed) as necessary to maintain a temperature of 500° F ± 50° F.

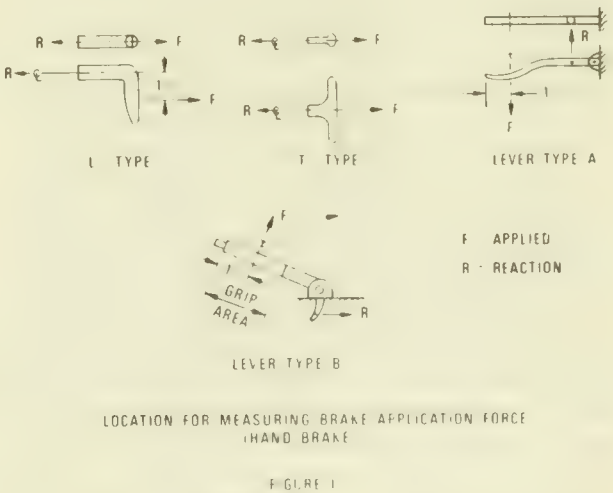
| TABLE IV | | |
|----------|-------|--|
| Series | Snubs | Snub conditions (highest speed indicated) |
| 1 | 175 | 40 to 20 mph |
| 2 | 25 | 45 to 20 mph |
| 3 | 25 | 50 to 20 mph |
| 4 | 25 | 55 to 20 mph |
| 5 | 250 | 60 to 20 mph |

S7.4.2.2 Brake adjustment—post burnish. After burnishing, adjust the brakes manually in accordance with the manufacturer's recommendation if the brake systems are manual or if the automatic adjusters are locked out, or by making stops as recommended by the manufacturer if the automatic adjusters are operative.

S7.5 Service brake system—second effectiveness test. Repeat S7.3. Then (for passenger cars) [and other vehicles with a GVWR of 10,000 lbs. or less] make four stops from 80 mph if the speed attainable in 2 miles is not less than 84 mph. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)]

S7.6 First reburnish. Repeat S7.4, except make 35 burnish stops or snubs. Reburnish a vehicle whose brakes are burnished according to S7.4.2.1 by making 35 snubs from 60 mph to 20 mph, but if the hottest brake reaches 500° F ± 50° F make the remainder of the 35 applications from such initial speed divisible by five but less than 60 mph as necessary to maintain a temperature of 500° F ± 50° F.

S7.7 Parking brake test. The parking brake tests for any vehicle on different grades, in different directions, and for different loads may be conducted in any order. The force required for actuation of a hand-operated brake system shall be measured at the center of the hand grip area or at a distance of 1½ inches from the end of the actuation lever, as illustrated in Figure 2.



S7.7 Test procedure for requirements of S5.2.1.

S7.7.1.1 Condition the parking brake friction elements so that the temperature at the beginning of the test is at any level not more than 150° F

(when the temperature of components on both ends of an axle are averaged).

S7.7.1.2 Drive the vehicle, loaded to GVWR, onto the specified grade with the longitudinal axis of the vehicle in the direction of the slope of the grade, stop the vehicle and hold it stationary by application of the service brake control, and place the transmission in neutral.

S7.7.1.3 With the vehicle held stationary by means of the service brake control, apply the parking brake by a single application of the force specified in (a) or (b), except that a series of applications to achieve the specified force may be made in the case of a parking brake system design that does not allow the application of the specified force in a single application:

[(a) In the case of a passenger car or other vehicle with a GVWR of 10,000 lbs. or less, not more than 125 pounds for a foot-operated system, and not more than 90 pounds for a hand-operated system; and

(b) In the case of a school bus with a GVWR greater than 10,000 lbs. not more than 150 pounds for a foot-operated system, and not more than 125 pounds for a hand-operated system. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)]

S7.7.1.4 Following the application of the parking brake in accordance with S7.7.1.3, release all force on the service brake control and commence the measurement of time if the vehicle remains stationary. If the vehicle does not remain stationary, reapplication of the service brake to hold the vehicle stationary, with reapplication of a force to the parking brake control at the level specified in S7.6.1.3(a) or (b) as appropriate for the vehicle being tested (without release of the ratcheting or other holding mechanism of the parking brake) may be used twice to attain a stationary position.

S7.7.1.5 Following observation of the vehicle in a stationary condition for the specified time in one direction, repeat the same test procedure with the vehicle orientation in the opposite direction on the specified grade.

S7.7.1.6 Check the operation of the parking brake application indicator required by S5.3.1(d).

S7.7.2 Test procedures for requirements of S5.2.2. (a) Check that transmission must be placed in park position to release key;

(b) Test as in S7.7.1, except in addition place the transmission control to engage the parking mechanism; and

(c) Test as in S7.7.1 except on a 20 percent grade, with the parking mechanism not engaged.

S7.7.3 Lightly loaded vehicle. Repeat S7.7.1 or S7.7.2 as applicable except with the vehicle at lightly loaded vehicle weight.

S7.7.4 Non-service brake type parking brake systems. For vehicles with parking brake systems not utilizing the service brake friction elements, burnish the friction elements of such systems prior to parking brake tests according to the manufacturer's published recommendations as furnished to the purchaser. If no recommendations are furnished, run the vehicle in an unburnished condition.

S7.8 Service brake system—lightly loaded vehicle (third effectiveness) test. Make six stops from 60 mph with vehicle at lightly loaded vehicle weight. [This test is not applicable to a vehicle which both has a GVWR of not less than 8,000 pounds and not greater than 10,000 pounds and is not a school bus. (46 F.R. 55—January 2, 1981. Effective: 9/1/83)]

S7.9 Service brake system test—partial failure.

S7.9.1 With the vehicle at lightly loaded vehicle weight, alter the service brake system to produce any one rupture or leakage type of failure, other than a structural failure of a housing that is common to two or more subsystems. Determine the control force, pressure level, or fluid level (as appropriate for the indicator being tested) necessary to activate the brake system indicator lamp. Make 4 stops if the vehicle is equipped with a split service brake system, or 10 stops if the vehicle is not so equipped, each from 60 mph, by a continuous application of the service brake control. Restore the service brake system to normal at completion of this test.

S7.9.2 Repeat S7.9.1 for each of the other subsystems.

S7.9.3 Repeat S7.9.1 and S7.9.2 with vehicle at GVWR. Restore the service brake system to normal at completion of this test.

S7.9.4 (For vehicles with antilock and/or variable proportioning brake systems.) With vehicle at GVWR, disconnect functional power source, or otherwise render antilock system inoperative. Disconnect variable proportioning brake system. Make four stops, each from 60 mph. If more than one antilock or variable proportioning brake subsystem is provided, disconnect or render one subsystem inoperative and run as above. Restore system to normal at completion of this test. Repeat for each subsystem provided. Determine whether the brake system indicator lamp is activated when the electrical power source to the antilock or variable proportioning unit is disconnected.

S7.10 Service brake system—inoperative brake power unit or brake power assist unit test. (For vehicles equipped with brake power unit or brake power assist unit.)

S7.10.1 Regular procedure. (This test need not be run if the option in S7.10.2 is selected.) On vehicles with brake power assist units, render the brake power assist unit inoperative, or one of the brake power assist unit subsystems if two or more subsystems are provided by disconnecting the relevant power supply. Exhaust any residual brake power reserve capability of the disconnected system. On vehicles with brake power units, disconnect the primary source of power. Make four stops, each from 60 mph, by a continuous application of the service brake control. Restore the system to normal at completion of this test. For vehicles equipped with more than one brake power unit or brake power assist unit, conduct tests for each in turn.

S7.10.2 Optional procedures—passenger cars only. On vehicles with brake power assist units, the unit is charged to maximum prior to start of

test. (Engine may be run up in speed, then throttle closed quickly to attain maximum charge on vacuum assist units.) Brake power units shall also be charged to maximum accumulator pressure prior to start of test. No recharging is allowed after start of test.

(a) (For vehicles with brake power assist units.)

Disconnect the primary source of power. Make six stops each from 60 mph, to achieve the average deceleration for each stop as specified in Table III. Apply the brake control as quickly as possible. Maintain control force until vehicle has stopped.

At the completion of the stops specified above, deplete the system of any residual brake power reserve capability. Make one stop from 60 mph at an average deceleration of not lower than 7 fpsps for passenger cars (equivalent stopping distance 554 feet), or 6 fpsps for vehicles other than passenger cars (equivalent stopping distance 646 feet) and determine whether the control force exceeds 150 pounds.

(b) (For vehicles with brake power units with accumulator type systems.) Test as in S7.10.2(a), except make 10 stops instead of 6 and, at the completion of the 10 stops, deplete the failed element of the brake power unit of any residual brake power reserve capability before making the final stop.

(c) (For vehicles with brake power assist or brake power units with backup systems.) If the brake power or brake power assist unit operates in conjunction with a backup system and the backup system is activated automatically in the event of a primary power failure, the backup system is operative during this test. Disconnect the primary source of power of one subsystem. Make 15 stops, each from 60 mph, with the backup system activated for the failed subsystem, to achieve an average deceleration of 12 fpsps for each stop.

(d) Restore systems to normal at completion of these tests. For vehicles equipped with more than one brake power assist or brake power unit, conduct tests of each in turn.

S7.11 Service brake system—first fade and recovery test.

S7.11.1 Baseline check stops or snubs.

S7.11.1.1 Vehicles with GVWR of 10,000 pounds or less. Make three stops from 30 mph at 10 fpsps for each stop. Control force readings may be terminated when vehicle speed falls to 5 mph. Average the maximum brake control force required for the three stops.

S7.11.1.2 Vehicles with GVWR greater than 10,000 pounds. With transmission in neutral (or declutched), make three snubs from 40 to 20 mph at 10 fpsps for each snub. Average the maximum brake control force required for the three snubs.

S7.11.2 Fade stops or snubs.

S7.11.2.1 Vehicles with GVWR of 10,000 pounds or less. Make 5 stops from 60 mph at 15 fpsps followed by 5 stops at the maximum attainable deceleration between 5 and 15 fpsps for each stop. Establish an initial brake temperature before the first brake application of 130° F to 150° F. Initial brake temperatures before brake applications for subsequent stops are those occurring at the distance intervals. Attain the required deceleration within 1 second and, as a minimum, maintain it for the remainder of the stopping time. Control force readings may be terminated when vehicle speed falls to 5 mph. Leave an interval of 0.4 mile between the start of brake applications. Accelerate immediately to the initial test speed after each stop. Drive 1 mile at 30 mph after the last fade stop, and immediately follow the recovery procedure specified in S7.11.3.1.

S7.11.2.2 Vehicles with GVWR greater than 10,000 pounds. With transmission in neutral (or declutched), make 10 snubs from 40 to 20 mph at 10 fpsps for each snub. Establish an initial brake temperature before the first brake application of 130° F to 150° F. Initial brake temperatures before brake application for subsequent snubs are those occurring in the time intervals specified below. Attain the required deceleration within 1 second and maintain it for the remainder of the snubbing time. Leave an

interval of 30 seconds between snubs (start of brake application to start of brake application). Accelerate immediately to the initial test speed after each snub. Drive for 1.5 miles at 40 mph after the last snub and immediately follow the recovery procedure specified in S7.11.3.2.

S7.11.3 Recovery stops or snubs.

S7.11.3.1 Vehicles with GVWR of 10,000 pounds or less. Make five stops from 30 mph at 10 fpsps for each stop. Control force readings may be terminated when vehicle speed falls to 5 mph. Allow a braking distance interval of 1 mile. Immediately after each stop accelerate at maximum rate to 30 mph and maintain that speed until making the next stop. Record the maximum control force for each stop.

S7.11.3.2 Vehicles with GVWR greater than 10,000 pounds. With transmission in neutral (or declutched), make five snubs from 40 to 20 mph at 10 fpsps, for each snub. After each snub, accelerate at maximum rate to 40 mph and maintain that speed until making the next brake application at a point 1.5 miles from the point of the previous brake application. Record the maximum control force for each snub.

S7.12 Service brake system—second reburnish. Repeat S7.6.

S7.13 Service brake system-second fade and recovery test. Repeat S7.11 except in S7.11.2 run 15 fade stops or 20 snubs instead of 10.

S7.14 Third reburnish. Repeat S7.6.

S7.15 Service brake system—fourth effectiveness test. Repeat S7.5. Then (for passenger cars) make four stops from either 95 mph if the speed attainable in 2 miles is 99 to (but not including) 104 mph, or 100 mph if the speed attainable in 2 miles is 104 mph or greater.

S7.16 Service brake system—water recovery test.

S7.16.1 Baseline check stop. Make three stops from 30 mph at 10 fpsps for each stop. Control force readings may be terminated when vehicle speed falls to 5 mph. Average the maximum brake control force required for the three stops.

S7.16.2 Wet brake recovery stops. With the brakes fully released at all times, drive the vehicle for 2 minutes at a speed of 5 mph, in any combination of forward and reverse directions, through a trough having a water depth of 6 inches. After leaving the trough, immediately accelerate at maximum rate to 30 mph without a brake application. Immediately upon reaching that speed make five stops, each from 30 mph at 10 fpsps for each stop. After each stop (except the last), accelerate the vehicle immediately at a maximum rate to a speed of 30 mph and begin the next stop.

S7.17 Spike stops. Make 10 successive spike stops from 30 mph with the transmission in neutral, with no reverse stops. Make spike stops by applying a control force of 200 pounds while recording control force versus time. Maintain control force until vehicle has stopped. At completion of 10 spike stops, make 6 effectiveness stops from 60 mph.

S7.18 Final inspection. Inspect—

(a) The service brake system for detachment or fracture of any components, such as brake springs and brake shoes or disc pad facing.

(b) The friction surface of the brake, the master cylinder or brake power unit reservoir cover, and seal and filler openings, for leakage of brake fluid or lubricant.

(c) The master cylinder or brake power unit reservoir for compliance with the volume and labeling requirements of S5.4.2 and S5.4.3. In determining the fully applied worn condition assume that the lining is worn to (1) rivet or bolt heads on riveted or bolted linings or (2) within $\frac{1}{32}$ inch of shoe or pad mounting surface or bonded linings, or (3) the limit recommended by the manufacturer, whichever is larger relative to the total possible shoe or pad movement. Drums or rotors are assumed to be at nominal design drum diameter or rotor thickness. Linings are assumed adjusted for normal operating clearance in the released position.

(d) The brake system indicator light(s), for compliance with operation in various key positions, lens color, labeling, and location, in accordance with S5.3.

S7.19 Moving barrier test. (Only for vehicles that have been tested according to S7.7.2.) Load the vehicle to GVWR, release parking brake and place the transmission selector control to engage the parking mechanism. With a moving barrier as described in paragraph 3.3 of SAE Recommended Practice J972 "Moving Barrier Collision Tests," November 1966, impact the vehicle from the front at 2½ mph. Keep the longitudinal axis of the barrier parallel with the longitudinal axis of the vehicle. Repeat the test, impacting the vehicle from the rear. Note: The vehicle used for this test need not be the same vehicle that has been used for the braking tests.

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75

Hydraulic Brake Systems

(Docket No. 75-11; Notice 2)

This notice amends Standard No. 105-75, *Hydraulic Brake Systems*, 49 CFR 571.105-75, to permit the manufacture of hydraulic-braked vehicles without split service brake systems as long as they are capable of meeting additional stopping requirements in the event of failure in the service brake system. A proposal of this modification was published May 12, 1975, (40 FR 20641), in response to petitions from Citroen Automobile Company, Maserati, S.P.A., and Volkswagen of America, Inc.

The three vehicle manufacturers requested modifications of Standard No. 105-75 (effective January 1, 1976) because its present requirement for a split service brake system (S5.1) would prevent the development and sale of vehicles utilizing a central hydraulic system with a single pump. The split system has two or more separate subsystems, each operating indefinitely in the event of a failure in another subsystem, and is required as a safety measure to ensure that at least one-half of the braking system will remain operational if any single failure occurs. The central hydraulic system used by Citroen employs a single pump to supply power to both front brakes and rear brakes. The petitions suggested and the NHTSA tentatively agreed that this type of central hydraulic system, which offers a limited number of stops upon a single failure, provides warning and reserve braking capabilities equivalent in safety to a split system. The petitioners asserted that the danger of operating indefinitely on one-half of a split system is as great as that of operating a central hydraulic system beyond its reserve capability.

The responses to the proposal (including approximately 30 endorsements from owners of Citroen vehicles which employ the central hy-

draulic system) generally supported the amendment to provide additional design flexibility in meeting Standard No. 105-75. Citroen, which intends to import passenger cars with central hydraulic systems, supported the proposal with one exception. The company pointed out that the special warning system specified in the proposal to accompany the central hydraulic system was technically unfeasible and conflicted with the existing requirements for warning systems in vehicles equipped with brake power units (S5.3.1). The same problem was raised by Clayton Dewandre Company Limited, a manufacturer of brake systems for trucks, and Volkswagen of America. Essentially, central hydraulic systems are designed to operate within a pressure range, with intermittent pump operation to restore the system accumulators to the higher pressure of the ranges as energy is used in braking or other hydraulic systems. A pressure sensor would be unable to distinguish the type of pressure drop experienced in this normal operation from that resulting from a rupture or leakage-type failure. Only after the pressure dropped below the pump "cut-in" pressure could the sensor experience an abnormal pressure level signifying system failure.

The proposal, in contrast, would have required a warning as soon as any leakage or rupture occurs, before the abnormal pressure drop would be sensed. To revise the requirement in practical terms, the NHTSA amends the standard to eliminate the conflict between the proposed requirement and the existing requirement of S5.3.1(a)(4) for a warning when the supply pressure in a brake power unit drops to some level not less than one-half of the normal system pressure.

The amendment is placed in the same section of the standard as other requirements for warning systems (S5.3) to improve the coherence of the entire standard and to clarify that the pressure warning required on central hydraulic systems is not redundant or in conflict with the warnings called for in S5.3.1(a).

For the same reason, the proposed requirement for additional stopping capability in central hydraulic systems is placed in the same section as the requirement for partial failure system performance of split service brake systems (S5.1.2). Also, the partial failure test procedures for central hydraulic systems have been consolidated into the test procedures for split service brake systems in S7.9.1.

Citroen, Volkswagen, and Clayton Dewandre stressed that the delay of warning signal necessitates a more fundamental modification of the proposed requirement for additional stopping capabilities. The proposal would have specified that the warning signal be activated as soon as the failure occurred, followed by a back-up capability of 10 stops from 60 mph. Now that the signal has been specified as occurring somewhat after the failure (when abnormal pressure loss can be sensed), the 10-stop capability must be required subsequent to activation of the signal so that braking capability is available to the driver for a reasonable time after he has been warned that a malfunction has occurred. Citroen, the only manufacturer that expects to manufacture vehicles subject to these requirements at this time, states that its system is entirely capable of providing 10-stops from 60 mph after the warning system activates. For this reason, the NHTSA considers it appropriate to amend the warning system requirement so that the 10-stop capability is available following activation of the signal.

The NHTSA also proposed a clarification of the test procedures for brake power unit failure (S7.10.2(b)). No comments addressed this matter, and the proposed change expanded slightly, is made final by this notice.

Citroen suggested that a brake fluid level indicator be specified as an additional safety system on central hydraulic systems, noting that such an indicator will become a requirement for vehicles with master cylinder reservoirs (as of September

1, 1976). Wagner Electric Corporation recommended that a "system energy monitoring device" be specified so that volume as well as pressure would be monitored, arguing that a pressure indicator alone will not indicate a failure of the charging device in an accumulator. Clayton Dewandre suggested that if a split service brake system is no longer required, then the brake system should be better protected against failures of non-brake systems (suspension, power steering) that are connected to the brake system.

The NHTSA considers each of these suggestions to have possible merit and contemplates a new proposal to treat these issues and provide for full opportunity for comment by interested persons. At this time, however, it is considered necessary to implement the amendments that will permit production of vehicles without split service brake systems under Standard No. 105-75.

Both Wagner Electric and General Motors questioned the part of the preamble to the proposal that stated, "The [Citroen] response indicates that the Citroen system is not responsible for a greater percentage of accidents than a conventional system." Both companies felt that the submitted information did not form a statistically adequate basis for that conclusion. The NHTSA agrees. The statement in question was only intended to report Citroen's evaluation of the material it submitted in support of its petition, and not to present a conclusion of the NHTSA.

In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) is amended. . . .

Effective date: October 10, 1975. Because these amendments have the effect of permitting actions that previously were prohibited, it is found for good cause shown that an effective date sooner than 30 days following publication in the *Federal Register* is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegations of authority at 49 CFR 1.51).

Issued on Oct. 3, 1975.

Gene G. Mannella
Acting Administrator

40 F.R. 47789
October 10, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75

Hydraulic Brake Systems

(Docket No. 75-11; Notice 2)

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For the same reason, the proposed requirement for additional stopping capability in central hydraulic systems is placed in the same section as the requirement for partial failure system performance of split service brake systems (S5.1.2). Also, the partial failure test procedures for central hydraulic systems have been consolidated into the test procedures for split service brake systems in S7.9.1.

Citroen, Volkswagen, and Clayton Dewandre stressed that the delay of warning signal necessitates a more fundamental modification of the proposed requirement for additional stopping capabilities. The proposal would have specified that the warning signal be activated as soon as the failure occurred, followed by a back-up capability of 10 stops from 60 mph. Now that the signal has been specified as occurring somewhat after the failure (when abnormal pressure loss can be sensed), the 10-stop capability must be required subsequent to activation of the signal so that braking capability is available to the driver for a reasonable time after he has been warned that a malfunction has occurred. Citroen, the only manufacturer that expects to manufacture vehicles subject to these requirements at this time, states that its system is entirely capable of providing 10-stops from 60 mph after the warning system activates. For this reason, the NHTSA considers it appropriate to amend the warning system requirement so that the 10-stop capability is available following activation of the signal.

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The NHTSA considers each of these suggestions to have possible merit and contemplates a new proposal to treat these issues and provide for full opportunity for comment by interested persons. At this time, however, it is considered necessary to implement the amendments that will permit production of vehicles without split service brake systems under Standard No. 105-75.

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Effective date: October 10, 1975. Because these amendments have the effect of permitting actions that previously were prohibited, it is found for good cause shown that an effective date sooner than 30 days following publication in the *Federal Register* is in the public interest.

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Issued on Oct. 3, 1975.

Gene G. Mannella
Acting Administrator

40 F.R. 47789
October 10, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75**Hydraulic Brake Systems****(Docket No. 75-27; Notice 2)**

This notice amends Standard No. 105-75, *Hydraulic Brake Systems*, 49 CFR 571.105-75, to revise the parking brake test procedure (S7.7). In addition, this notice amends Subpart B of Part 575, *Consumer Information*, 49 CFR § 575.101, by replacing the present test procedures in that section for passenger car testing with equivalent procedures from Standard No. 105-75.

The NHTSA proposed a modification of the parking brake test procedures in Standard No. 105-75 to permit a reapplication of the parking brake if the first application of the brake failed to hold the vehicle stationary on the test incline. Toyo Kogyo requested the modification as representative of normal driver action (in cases where the application appears to be insufficient to hold the vehicle), justifying the change as necessary to permit new vehicle components to stretch or "set" during the initial application as occurs in any vehicle delivered to a purchaser. The NHTSA agreed that reapplication would be a reasonable test procedure and proposed a revision of S7.7.

Comments were received from Toyo Kogyo, General Motors, American Motors Corporation, and Chrysler Corporation in support of the change. No comments were received that objected to the proposal. The standard is amended accordingly.

The NHTSA also proposed that the consumer information item requiring publication of the stopping ability of passenger cars and motorcycles (49 CFR § 575.101) be modified for passenger cars so that test data developed under Standard No. 105-75 could be the basis for the required consumer information. The existing test procedures of the consumer information item

would be replaced by Standard No. 105-75 test procedures, and a transition period until January 1, 1977, would be provided to allow manufacturers latitude in adopting the new procedures.

The Motor Vehicle Manufacturers Association (MVMA), Chrysler Corporation, American Motors Corporation, Ford Motor Company, and General Motors Corporation supported the modifications. The MVMA and Ford pointed out an inadvertent omission in the proposal of a required change in the present loading specification (maximum loaded vehicle weight) to the Standard No. 105-75 loading specification (gross vehicle weight rating (GVWR)). No comments opposed the modification, and the consumer information item is therefore amended as proposed, with the additional modification noted by the MVMA and Ford. The transition period for use of either loading specification conforms to the transition period for use of either test procedure (until January 1, 1977). The MVMA asked for a June 1, 1977, date for transition to the new loading specification but did not explain the need for more time. The NHTSA will consider any data on this subject submitted by the MVMA.

With regard to test loading, Chrysler Corporation repeated a request for revision of the loading conditions of Standard No. 105-75. The request was earlier submitted improperly as a petition for reconsideration of an NHTSA action which did not deal with test loading (40 FR 24525, June 9, 1975). Section 553.35 of NHTSA regulations (49 CFR 553.35) allows petitions for reconsideration of rules issued by the NHTSA, but in this case no rule was issued on test loading that could form the basis for reconsideration. The NHTSA discussed Chrysler's

Effective: January 6, 1976

request at a meeting with Chrysler officials on August 21, 1975. Based on the limited information presented by Chrysler at that meeting, the NHTSA has concluded that a reduction in test weight would not be justified. At the meeting it was agreed that Chrysler would submit any additional data it had in support of the request. To date no data have been received, and the NHTSA cannot meaningfully reconsider Chrysler's request without further data.

The NHTSA also proposed modification of the means for establishing the skid number of the surface on which stopping distance tests are conducted in Standard No. 105-75, Standard No. 121, *Air Brake Systems*, Standard No. 122, *Motorcycle Brake System*, and the Consumer Information Item on brake performance. Comments received were not in agreement on how to accomplish the transition from the former ASTM method to the new one. The skid number proposal will therefore be treated separately at a later date so that its resolution will not delay

this amendment of the parking brake and consumer information item test procedures.

In consideration of the foregoing, amendments are made in Chapter V of Title 49, Code of Federal Regulations. . . .

Effective date: January 6, 1976. Because these amendments, to the extent that they impose new substantive requirements, are made optional for an interim period, and because manufacturers must plan future testing based on the test procedures as they exist in the present standard, it is found for good cause shown that an immediate effective date is in the public interest.

(Sec. 103, 119 Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51).

Issued on December 31, 1975.

James B. Gregory
Administrator

41 F.R. 1066
January 6, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75**Hydraulic Brake Systems****(Docket No. 75-27; Notice 2)**

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would be replaced by Standard No. 105-75 test procedures, and a transition period until January 1, 1977, would be provided to allow manufacturers latitude in adopting the new procedures.

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this amendment of the parking brake and consumer information item test procedures.

In consideration of the foregoing, amendments are made in Chapter V of Title 49, Code of Federal Regulations. . . .

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James B. Gregory
Administrator
41 F.R. 1066
January 6, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75**Hydraulic Brake Systems****(Docket No. 75-7; Notice 2)**

This notice amends Standard No. 105-75, *Hydraulic Brake Systems*, 49 CFR 571.105-75, to extend its applicability to school buses and to establish performance levels for this vehicle category.

The NHTSA proposed applicability of the hydraulic brake standard to school buses (40 FR 18469, April 28, 1975) in satisfaction of the mandate of the Motor Vehicle and Schoolbus Safety Amendments of 1974 (Pub. L. 93-492) to issue safety standards for school bus operating systems (15 U.S.C. § 1392(i)(1)(A)). The Act established a strict schedule for promulgation of the standards, requiring their effectiveness 9 months following promulgation. With a view to this limited leadtime, the NHTSA proposed performance levels based on Society of Automotive Engineers (SAE) recommended practices that reflect the better existing school bus designs. Permissible pedal force values and fade and recovery performance were proposed at somewhat more stringent levels than the SAE practice, in view of the "stop-and-go" duty cycle of school buses, and the high incidence of women as school bus operators.

Commenters generally supported extension of the hydraulic brake standard to school buses. The American Mutual Insurance Alliance supported the standard as proposed. The California Highway Safety Foundation and Action for Child Transportation Safety (ACTS) advocated early implementation of requirements for all hydraulic-braked trucks, buses and multipurpose passenger vehicles to improve their braking compatibility with school buses and passenger cars. The California Department of Highway Patrol (CHP) expressed concern that any bus could

be converted into a school bus after sale, and that all buses should therefore be required to meet minimum braking requirements. The NHTSA is presently preparing rulemaking for hydraulic-braked trucks, buses, and MPV's, and these comments are being taken into consideration. In view of the Congressional mandate for swift implementation of school bus standards, however, this rulemaking is being made final largely as it was proposed.

The NHTSA proposed a level of service brake system performance generally based on SAE values, both for school buses of 10,000 pounds gross vehicle weight rating (GVWR) or less, and for school buses with a GVWR or more than 10,000 pounds. Wagner Electric Corporation, Chrysler Corporation, International Harvester Co., and Ford Motor Company asked for relaxation of the requirements, while the Vehicle Equipment Safety Commission (VESC) and ACTS requested more stringent requirements. General Motors supported the requirements for buses with a GVWR of 10,000 pounds or less.

The first effectiveness test (S5.1.1.1) measures the stopping ability of the service brake system as it is delivered to the user before it has been burnished (broken in) through use. Wagner argued that this test is unnecessary and therefore wasteful because the stringency of later tests assures the adequacy of the "green" braking components to stop the vehicle. The company cited variables in the unconditioned components that make it ". . . unrealistic to assume that exact brake performance can be predicted or that test results can be repeated without the thermal and mechanical conditioning of these surfaces."

It is the NHTSA's intent in the first effectiveness test to assure a safe vehicle in the hands of the user from the moment of delivery. The same variables cited by Wagner that make prediction of test results difficult could also make performance in the hands of the user unpredictable, unless the design is carefully controlled. The NHTSA concludes that the first effectiveness requirement is a reasonable method of ensuring adequate new-vehicle performance, and denies Wagner's request to delete this requirement.

Chrysler and Ford recommended increasing the first effectiveness stopping distances at 30 mph for school buses with a GVWR of 10,000 pounds or less. Both argued that vehicles take significantly longer to stop in an unburnished condition and therefore the required stopping distance for first effectiveness should be longer than the second effectiveness requirement. The NHTSA established the unburnished stopping distance requirements based on tests of vehicles by NHTSA contractors and its Safety Research Laboratory. The NHTSA has reexamined its test results in view of manufacturer comments, and has determined that the complying distances recorded were not generated in all cases at the "worst case" weight at which a vehicle could be tested. For this reason, and because of the variability noted above, the NHTSA has increased the first effectiveness stopping distances for school buses of 10,000 pounds GVWR or less to 69 feet. This change represents a 1 fpsps decrease in average deceleration rate from the second effectiveness value, as is the case for passenger cars.

In the case of vehicles with a GVWR of more than 10,000 pounds, Wagner, Chrysler, and International Harvester requested longer stopping distances at 30 mph. The VESC and ACTS requested the same stopping distances for heavy school buses as for lighter ones. The NHTSA proposed more stringent low-speed stopping requirements than the SAE values to remain consistent with existing requirements of the National Conference on School Transportation, the State of California, and the Bureau of Motor Carrier Safety. International Harvester pointed out that, while the distances are comparable, the requirements are in fact more stringent because of

the "no lockup" requirement and the limits on pedal control force in Standard No. 105-75. In view of these variations from existing 30-mph stopping distance requirements, and the less effective braking encountered prior to burnish, the first effectiveness stopping distance at 30 mph is increased from 81 feet to 88 feet. In terms of deceleration rate, this 7-foot increase is comparable to the 4-foot increase for light school buses. Stopping distance requirements other than 30-mph first effectiveness values are adopted as proposed.

The second effectiveness test (S5.1.1.2) is of the service brake system following burnish of the brakes and with the vehicles loaded to its GVWR. Comments were received from Wagner and International Harvester on the distance established for 30-mph stops, and from the VESC and ACTS on the full range of stopping distance requirements, for both light and heavy school buses. International made the same point that it made for other stopping distance tests: that the low-speed distances chosen as comparable to existing requirements are somewhat more difficult due to Standard No. 105-75's specification of "no lockup" and pedal control force limits. In this case, however, the value chosen is far less demanding than that for the unburnished brakes, and the factors cited by International are not as crucial.

Wagner assumed that the NHTSA, in adopting existing school bus "equivalent distance" performance requirements for actual road tests, had not compensated for the fact that existing standards refer to deceleration rates measured by inertial decelerometers. Actually, the NHTSA did apply correction factors to compensate for this fact. Wagner's request for longer distances is denied for this reason.

ACTS asked that the NHTSA set performance requirements equal to those for other vehicles that share the highway with school buses. The VESC recommended decreased stopping distances roughly comparable to values for trucks and buses in Standard No. 105-75 before the standard was indefinitely delayed (40 FR 18411, April 28, 1975). For reasons established in the preamble to that decision, the NHTSA is considering appropriate interim performance levels

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Commenters generally supported extension of the hydraulic brake standard to school buses. The American Mutual Insurance Alliance supported the standard as proposed. The California Highway Safety Foundation and Action for Child Transportation Safety (ACTS) advocated early implementation of requirements for all hydraulic-braked trucks, buses and multipurpose passenger vehicles to improve their braking compatibility with school buses and passenger cars. The California Department of Highway Patrol (CHP) expressed concern that any bus could

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for hydraulic-braked vehicles other than passenger cars, but is not prepared to specify performance levels at this time. The ACTS and VESC requests will be considered as they apply to those interim requirements, but cannot be considered in this rulemaking because they would necessitate hardware changes that cannot be effectuated prior to the October 27, 1976, statutory deadline for effectiveness of this standard.

The NHTSA proposed that second effectiveness performance requirements at speeds in excess of 60 mph not be specified for school buses. The VESC has argued that such requirements should apply to school buses if they have such high speed capability. While the NHTSA cannot promulgate requirements in this area in the short period that remains prior to the standard's mandated effectiveness, the VESC position will be considered in developing future standards for all vehicles other than passenger cars, including school buses. In view of the above, the second effectiveness distances are adopted as proposed.

No comment was received on the requirements for lightly-loaded stopping distances (S5.1.1.3) other than those already discussed with regard to the second effectiveness test, and the proposed values are therefore also adopted. The second sentence of S5.1.1.3 (referring to vehicles to which the standard is no longer applicable) is also deleted as proposed.

The fourth effectiveness test (S5.1.1.4) is of the abilities of the brake system after it has been subjected to fade and recovery testing under S5.1.4. Manufacturer comments indicated that, in the case of school buses with a GVWR greater than 10,000 pounds, use of a "hot" burnish procedure (S7.4.2.1.2) in combination with the standard's fade and recovery testing makes the fourth effectiveness test redundant. NHTSA analysis agrees with these arguments, and in view of the fact that the hot burnish option will become the only permissible method of conditioning the brakes after September 1, 1976, the proposed fourth effectiveness test for heavier school buses is not adopted.

Since use of the hot burnish procedure was an important factor in the decision to drop the fourth effectiveness requirement for vehicles over 10,000 pounds GVWR, the NHTSA denies the

Wagner petition to extend the alternative burnish procedures under S7.4.2.1 after the scheduled deletion of that option on September 1, 1976. Because this option ends before the standard's effectiveness for school buses, S7.4.2.1 has been simplified by eliminating the cold burnish procedure, (S7.4.2.1.1) that will not be used.

The NHTSA also notes General Motors' argument that the fourth effectiveness test should be eliminated for vehicle classes offered with either hydraulic or air brakes simply because there is no comparable requirement in Standard No. 121, *Air Brake Systems*. While the NHTSA agrees that vehicle classes ideally might be subjected to identical requirements whatever the method of brake actuation, formulation of any desired compatibility between hydraulic and air-braked vehicles of the same weight class must be accomplished separately from this rulemaking on school buses, which is subject to a statutory deadline. General Motors' view will be considered in future rulemaking.

The April 28 notice proposed deletion, for school buses, of the option methods for testing the service brake system in the event the brake power assist or brake power unit failed (S5.1.3). The only comment received was from the VESC, which misunderstood the proposal as deleting all tests of a failed power assist or power unit. In fact, school buses will be required to meet S5.1.3.1 as hereby amended. The VESC misunderstanding may have arisen because of unclear language used in proposing an amendment of the test procedure of S7.10 that underlies the requirement. Section S7.10 is appropriately revised in this amendment of the standard.

The NHTSA proposed more stringent fade and recovery performance for school buses than the SAE's recommended levels for other truck-type vehicles, because of the distinctive school bus duty cycle. School buses make a high number of stops compared to the truck-type vehicles which may share common components. These stops are usually made on secondary roads that often have steeper grades than the primary road system. The National School Transportation Association (NSTA) confirmed in statements before an NHTSA public meeting on hydraulic brakes that the association's experience indicated

inadequate fade resistance in some of today's school buses. While NHTSA testing indicates that some buses already conform to this requirement, other buses will be required to upgrade their brake systems to conform to this minimum performance level.

Three manufacturers objected to this performance level and each suggested a different modification of the proposed requirement to reduce its stringency. Ford requested a 200-pound allowable pedal force for the first five stops, stating that "The 60 mph fade sequence represents, in Ford's opinion, an extreme condition that would rarely, if ever, be duplicated in normal customer operation of school buses." Wagner stated "It is inconsistent to require one degree of vehicle braking for the Effectiveness Test and another (in this case, more powerful) for the Fade and Recovery. . . . We agree in the need for some measure of fade and recovery but the redundancy of two such requirements in a *minimum* standard has not been addressed. . . ." General Motors cited the good safety record of school buses, questioned the adequacy of NHTSA testing, and stated, with regard to school buses with a GVWR of more than 10,000 pounds, ". . . the NHTSA has proposed stringent fade and recovery requirements which far exceed minimum performance requirements."

"Minimum" performance standards do not equate with "minimal" performance standards, as implied by General Motors and Wagner. The word "minimum" in the statutory definition of motor vehicle safety standards (15 U.S.C. § 1391-(2)), does not refer to the substantive content of the standards but rather to their legal status—that the products covered must not fall short of them.

Wagner considered it inconsistent to specify a performance level for the fade characteristics of a braking system that would have the effect of improving another characteristic of the braking system (stopping distance performance) beyond the minimum level specified in the standard. The NHTSA disagrees, and considers it appropriate to specify the minimum fade performance necessary to assure adequate performance of brakes in stop-and-go operation, whether or not satisfaction of this minimum level results in a brake

system with better stopping distance performance than required by the standard.

While Ford is correct that the test sequence typically will not be experienced in day-to-day operations, that does not rule out the need for the improved fade characteristics suggested by the NSTA. Each of the commenters claims that the fade and recovery characteristics do exceed the poorest performance of some existing vehicles, but none presented convincing justification for their positions that the proposed levels are inappropriate for school bus braking systems. It is also noted that school buses with a GVWR of more than 10,000 pounds no longer have to meet the high-speed or fourth effectiveness requirements. With regard to Ford's suggestion of permitting a 200-pound pedal control force, the NHTSA continues to consider a 150-pound maximum necessary in view of the large percentage of school bus operators that are women (see HSRI Report No. HuF-6, NBS Technical Note 557, October 1970, "The Brake Pedal Force Capability of Adult Females"). Accordingly, the fade and recovery performance values are promulgated as proposed. The proposed wording of S5.1.4.3(b)(2) is modified for clarity in response to Wagner's request.

The proposal included a minimum performance level for the ability of school bus brakes to perform after they are soaked with water. Three comments were received that objected to the proposed performance levels. Wagner also objected that the test conditions were stated with insufficient specificity. The width of the water trough used to wet the brakes is not specified and the width may affect the degree of wetting achieved in large truck tire sizes. The NHTSA intends to address this issue in its upcoming proposal on test intervals in the water recovery test.

For the present NHTSA will resolve differences in this test condition in the manufacturer's favor if they affect the outcome of testing.

General Motors' only objection to inclusion of a water recovery test in this standard for school buses over 10,000 pounds GVWR was that a comparable test in Standard No. 121 has not been developed. The NHTSA is not, of course, limited in the breadth of one standard by the breadth of another, whether or not they measure the same aspect of performance of a vehicle.

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International was the only manufacturer to provide data indicating that its vehicles are not capable of meeting the water recovery test in all cases. The NHTSA concludes that other manufacturers' products are capable of meeting the levels established in the standard. The NHTSA denies International's request to permit a 1.5-mile "drying-off" period between wet stops, because it would negate for the most part the effect of soaking.

Therefore, the only modification of water recovery testing from that proposed is to clarify the wording of the minimum permissible control force (S5.1.5.2(b)(2)) as requested by Wagner.

The spike stop and parking brake requirements are amended as proposed.

The test procedures contained in S6.1, S6.2, S7.5, S7.7.1, and S7.10 are revised as appropriate to reflect the amended requirements.

Wagner, Ford, General Motors, and International requested that the brake fluid level indicator not be required for school buses. The NHTSA will make its decision in this area shortly and will publish its response to the issues raised in this rulemaking.

Ford also asked that the parking brake warning indicator be deleted from school bus requirements as a luxury. The NHTSA has never considered this signal to be a luxury, and considers it important to prevent a partially-applied brake from overheating, reducing its efficiency. Ford's request is therefore denied.

Wagner proposed that the present speed range for brake warming in S7.1 and S7.2 (40-to-10-mph snubs) be increased to a range of 50-to-20-mph snubs. The agency has seen no evidence in its test program of the inadequacy of present values, and therefore denies the Wagner request, which was not supported by any data.

The California Department of Highway Patrol (CHP) raised the issue of the adequacy of the standard from the enforcement perspective, particularly the complexity of the stopping distance requirements for use in vehicle-in-use inspection. As noted in a recent notice on air brakes (40 FR 56920, December 5, 1975), new vehicle braking standards may be inappropriate for a State inspection program, because they are not designed to measure degradation of equipment and performance over a period of time.

Since degradation of the brake system is not addressed by Standard No. 105-75, the CHP is not prevented by the National Traffic and Motor Vehicle Safety Act (15 U.S.C. 1392(d)) from enforcing requirements that measure the condition of the vehicle, as long as they do not dictate the design or performance of new vehicles.

The CHP recommendations for vacuum gauge and vacuum failure requirements on school buses equipped with vacuum-boosted brakes are being taken under consideration in regard to future rulemaking for truck, bus, and multi-purpose passenger vehicle hydraulic braking standards.

SWS Silicon Corporation's comments on DOT 5 brake fluid are noted, and comments of any interested person on the subject of appropriate brake fluids for school buses are solicited.

In an area unrelated to the applicability of the standard to school buses, persons have requested clarification of an amendment of the standard published September 17, 1975 (40 FR 42872). Section S5.1.5.2(a) consists of an opening paragraph, two numbered subparagraphs, and a concluding paragraph. Subparagraph "(2)" was set forth in its entirety in a revised form in that September action, and it was not clear whether the concluding paragraph that follows it remained unchanged or was eliminated in the revision. For clarification, it is noted that only the subparagraph "(2)" was revised and that the concluding paragraph remains in the standard unchanged.

In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) is. . .

Effective date: Oct. 12, 1976. The effective date of this amendment is established as 9 months after the date of its issuance, as required by the Motor Vehicle and Schoolbus Safety Amendments of 1974, Pub. L. 93-492, section 202 (15 U.S.C. 1397(i)(1)(A)).

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); § 202, Pub. L. 93-492, 88 Stat. 1470 (15 U.S.C. 1392); delegation of authority at 49 CFR 1.50)

Issued on January 12, 1976.

James B. Gregory
Administrator

41 F.R. 2391
January 16, 1976

International was the only manufacturer to provide data indicating that its vehicles are not capable of meeting the water recovery test in all cases. The NHTSA concludes that other manufacturers' products are capable of meeting the levels established in the standard. The NHTSA denies International's request to permit a 1.5-mile "drying-off" period between wet stops, because it would negate for the most part the effect of soaking.

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Ford also asked that the parking brake warning indicator be deleted from school bus requirements as a luxury. The NHTSA has never considered this signal to be a luxury, and considers it important to prevent a partially-applied brake from overheating, reducing its efficiency. Ford's request is therefore denied.

Wagner proposed that the present speed range for brake warming in S7.1 and S7.2 (40-to-10-mph snubs) be increased to a range of 50-to-20-mph snubs. The agency has seen no evidence in its test program of the inadequacy of present values, and therefore denies the Wagner request, which was not supported by any data.

The California Department of Highway Patrol (CHP) raised the issue of the adequacy of the standard from the enforcement perspective, particularly the complexity of the stopping distance requirements for use in vehicle-in-use inspection. As noted in a recent notice on air brakes (40 FR 56920, December 5, 1975), new vehicle braking standards may be inappropriate for a State inspection program, because they are not designed to measure degradation of equipment and performance over a period of time.

Since degradation of the brake system is not addressed by Standard No. 105-75, the CHP is not prevented by the National Traffic and Motor Vehicle Safety Act (15 U.S.C. 1392(d)) from enforcing requirements that measure the condition of the vehicle, as long as they do not dictate the design or performance of new vehicles.

The CHP recommendations for vacuum gauge and vacuum failure requirements on school buses equipped with vacuum-booster brakes are being taken under consideration in regard to future rulemaking for truck, bus, and multi-purpose passenger vehicle hydraulic braking standards.

SWS Silicon Corporation's comments on DOT 5 brake fluid are noted, and comments of any interested person on the subject of appropriate brake fluids for school buses are solicited.

In an area unrelated to the applicability of the standard to school buses, persons have requested clarification of an amendment of the standard published September 17, 1975 (40 FR 42872). Section S5.1.5.2(a) consists of an opening paragraph, two numbered subparagraphs, and a concluding paragraph. Subparagraph "(2)" was set forth in its entirety in a revised form in that September action, and it was not clear whether the concluding paragraph that follows it remained unchanged or was eliminated in the revision. For clarification, it is noted that only the subparagraph "(2)" was revised and that the concluding paragraph remains in the standard unchanged.

In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) is . . .

Effective date: Oct. 12, 1976. The effective date of this amendment is established as 9 months after the date of its issuance, as required by the Motor Vehicle and Schoolbus Safety Amendments of 1974, Pub. L. 93-492, section 202 (15 U.S.C. 1397(i)(1)(A)).

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); § 202, Pub. L. 93-492, 88 Stat. 1470 (15 U.S.C. 1392); delegation of authority at 49 CFR 1.50)

Issued on January 12, 1976.

James B. Gregory
Administrator

41 F.R. 2391
January 16, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75

Hydraulic Brake Systems

(Docket No. 70-27; Notice 18)

This notice amends Standard No. 105-75, *Hydraulic Brake Systems*, to permit a manufacturer to provide either a gross loss of pressure indicator (GLPI) or a low brake fluid level indicator (BFLI) in satisfaction of the hydraulic failure indicator requirements of S5.3.1.

This amendment of Standard No. 105-75 (49 CFR 571.105-75) was proposed in response to petitions from Ford Motor Company, Wagner Electric Corporation, and Mercedes-Benz of North America, Inc., as well as the comments of other manufacturers of hydraulic-braked motor vehicles (41 FR 2828, January 20, 1976).

Comments were received from General Motors Corporation, Bob Ingham, Jr., Chrysler Corporation, Wagner Electric Corporation, the California Department of Highway Patrol (CHP), Professor P. N. Joubert, Bendix Corporation, British Leyland UK Limited, the Vehicle Equipment Safety Commission, Ford Motor Company, Bayerische Motoren Werke, and the Department of Transport of Australia. The National Motor Vehicle Safety Advisory Council made no comment on the proposal.

All commenters except the CHP, VESC, Department of Transport of Australia, and Professor Joubert endorsed the amendment as proposed and urged its swift implementation.

The CHP recommended that the proposed option be allowed only until the availability and reliability problems associated with the BFLI are resolved, at which time the BFLI would be required on all vehicles. The VESC also recommended a requirement for both of the devices or the BFLI alone. It is the opinion of the CHP that the apparent benefit of a GLPI is not real, because the GLPI warning activates only after failure has occurred, when increased pedal travel and decreased stopping performance have al-

ready warned of the faulty condition. However, the failure of one subsystem in split system vehicles, particularly that to the rear wheels, easily may go unnoticed during the low rate-of-deceleration stops encountered in normal driving. In this vast majority of cases, the driver will be warned of the failure by the GLPI before the brake failure is apparent, a substantial benefit in averting accidents.

Each of the four commenters who did not support the proposal found fault with the NHTSA's use of the extremely limited accident data from the Indiana University Institute for Research in Public Safety study (*Tri-Level Study of the Causes of Traffic Accidents*, DOT-HS-801-335, January, 1975). The four commenters apparently interpreted Notice 17 to mean that the NHTSA had concluded, based on this small amount of data, that the BFLI was not cost-effective. Such is not the case. The NHTSA's evaluation of the Indiana study only concluded that its earlier judgement that both warnings were justified was cast in some doubt by the limited data generated since that initial decision was made. The NHTSA believes that the doubt is sufficient to justify dropping the simultaneous requirement for both devices.

As noted by the CHP, the accident data are not yet available to quantitatively prove the comparative benefits of one warning system over the other. Although the four dissenting commenters expressed a preference for the BFLI, the NHTSA feels that there is insufficient evidence of its superiority to mandate its use in place of the GLPI. The NHTSA believes that a continuation of the option previously available under Standard No. 105 is in the public interest.

Ford Motor Company pointed out that the proposed wording of S7.9.1, which refers to a

Effective: April 22, 1976

“brake system failure indicator,” was inconsistent with other references in the standard, and suggested that the word “failure” be removed. The reference has been changed to read “brake system indicator lamp” to be consistent with S5.3. Section S7.9.4 also is reworded for the same reason.

In a matter unrelated to the BFLI proposal, the agency hereby corrects an inadvertent omission of a conforming amendment that should have accompanied the major amendment making the standard applicable to school buses (41 FR 2391, January 16, 1976). The reference to “S7.4.2.1.2” in S6 is changed to “S7.4.2.1.”

In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) is amended....

Effective date: April 22, 1976. Because this amendment creates no additional requirements for any person and because of the manufacturers' need to know as soon as possible the vehicle requirements for the upcoming model year for planning purposes, it is found that an immediate effective date is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegations of authority at 49 CFR 1.50 and 49 CFR 501.8.)

Issued on April 14, 1976.

James B. Gregory
Administrator

41 F.R. 16803
April 22, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75**Hydraulic Brake Systems****(Docket No. 70-27; Notice 18)**

This notice amends Standard No. 105-75, *Hydraulic Brake Systems*, to permit a manufacturer to provide either a gross loss of pressure indicator (GLPI) or a low brake fluid level indicator (BFLI) in satisfaction of the hydraulic failure indicator requirements of S5.3.1.

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Comments were received from General Motors Corporation, Bob Ingham, Jr., Chrysler Corporation, Wagner Electric Corporation, the California Department of Highway Patrol (CHP), Professor P. N. Joubert, Bendix Corporation, British Leyland UK Limited, the Vehicle Equipment Safety Commission, Ford Motor Company, Bayerische Motoren Werke, and the Department of Transport of Australia. The National Motor Vehicle Safety Advisory Council made no comment on the proposal.

All commenters except the CHP, VESC, Department of Transport of Australia, and Professor Joubert endorsed the amendment as proposed and urged its swift implementation.

The CHP recommended that the proposed option be allowed only until the availability and reliability problems associated with the BFLI are resolved, at which time the BFLI would be required on all vehicles. The VESC also recommended a requirement for both of the devices or the BFLI alone. It is the opinion of the CHP that the apparent benefit of a GLPI is not real, because the GLPI warning activates only after failure has occurred, when increased pedal travel and decreased stopping performance have al-

ready warned of the faulty condition. However, the failure of one subsystem in split system vehicles, particularly that to the rear wheels, easily may go unnoticed during the low rate-of-deceleration stops encountered in normal driving. In this vast majority of cases, the driver will be warned of the failure by the GLPI before the brake failure is apparent, a substantial benefit in averting accidents.

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Ford Motor Company pointed out that the proposed wording of S7.9.1, which refers to a

Effective: April 22, 1976

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In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) is amended....

Effective date: April 22, 1976. Because this amendment creates no additional requirements for any person and because of the manufacturers' need to know as soon as possible the vehicle requirements for the upcoming model year for planning purposes, it is found that an immediate effective date is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegations of authority at 49 CFR 1.50 and 49 CFR 501.8.)

Issued on April 14, 1976.

James B. Gregory
Administrator

41 F.R. 16803
April 22, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75**Hydraulic Brake Systems****(Docket No. 75-27; Notice 4)**

This notice amends Standard No. 105-75, *Hydraulic Brake Systems*, and Standard No. 122, *Motorcycle Brake Systems*, to modify the means for establishing the frictional resistance of the surface on which stopping distance tests are conducted. A similar amendment is made to Part 575, *Consumer Information*, of Title 49 of the Code of Federal Regulations.

The National Highway Traffic Safety Administration (NHTSA) proposed the change in Standard No. 105-75 (49 CFR 571.105-75), Standard No. 121, *Air Brake Systems* (49 CFR 571.121), Standard No. 122 (49 CFR 571.122), and the Consumer Information Regulations (49 CFR 575.101) in response to a petition from British-Leyland Motors Limited (40 FR 45200, October 1, 1975). The existing test procedure in these regulations has specified use of the American Society for Testing and Materials (ASTM) E-274-65T procedure, using an ASTM E249 tire that is no longer manufactured.

Responses were received on the proposed ASTM change from White Motor Corporation (White), Mack Trucks, Inc. (Mack), Freightliner Corporation (Freightliner), Ford Motor Company (Ford), General Motors Corporation (GM), Chrysler Corporation (Chrysler), American Motors Corporation (AMC), and International Harvester (IH). The National Motor Vehicle Safety Advisory Council made no comment on the proposal.

Most commenters supported use of the new test procedure and tire, although they differed in recommendations for correlating the reading produced under the new procedure with that produced under the old procedure. Manufacturers are presently certifying compliance to brake standards on test surfaces with a satisfactory reading under the old procedure, and they should

be able to continue testing and certifying compliance on the same surface without any increase in the severity of the tests. To accomplish this transition, the correlation in readings between the procedures has been determined, and the difference is reflected in a change of the dry surface value from "skid number" 75 to "skid number" 81.

Freightliner urged postponement of any action until it could be supported by "adequate and statistically reliable test data." AMS also recommended that the NHTSA do nothing "until the industry has had sufficient time to evaluate and verify the performance of the ASTM E501 test tire on all types of surfaces."

The change in procedure is prompted by the ASTM decision to utilize a new tire in ascertaining the frictional coefficient of test surfaces. As a result the old tire is no longer manufactured and only the new tire is available for skid number measurement. Manufacturers have conducted comparative tests with the new tire to determine the correlation between the readings given by the two tires. Neither Freightliner nor AMC submitted data showing that the agency's proposal to adjust the dry surface skid number upwards is unjustified. Only Mack submitted data and it supported the NHTSA and Federal Highway Administration test data that have been placed in the docket. General Motors considered the agency's proposed upward adjustment to be the maximum desirable based on its data. International Harvester, Chrysler, and Ford supported the change in dry surface skid number without qualification, and White suggested that a skid number of 85 be utilized. The agency finds that the AMC and Freightliner requests for further delay are unjustified.

Ford and Freightliner asked that the skid number for the lower coefficient (wet) surface also be adjusted. The agency's purpose in proposing the adjustment is limited to changes necessary to avoid a modification of the test surfaces or an increase in the severity of performance levels specified under the safety standards. The NHTSA earlier concluded that change of the wet surface specification was unnecessary, and no evidence has been supplied that would modify the earlier determination.

General Motors noted that an editorial change to the newer ASTM procedure does not appear in early publications of that procedure. To put all interested persons on notice of the editorial change, the NHTSA has included the change in its references to the ASTM E274-70 procedure.

Freightliner asserted that the newer procedure included modification of a formula that justified a larger upwards adjustment than that proposed by the agency. Actually, the modifications only corrected an error in the earlier formula which had no effect on the determination of frictional coefficient. Manufacturers either utilized a test trailer that obviated the need for calculations using the formula, or were aware of the error and corrected for it in their calculations. Thus the adjustment requested by Freightliner is not warranted.

In accordance with recently-enunciated Department of Transportation policy encouraging adequate analysis of the consequences of regulatory action (41 FR 16201, April 16, 1976), the agency herewith summarizes its evaluation of the economic and other consequences of this amendment on the public and private sectors, including possible loss of safety benefit. Because the new references to procedures and a test tire are expected to accord with existing practices, the amendment is judged not to have any significant

impact on costs or benefits of the standards and consumer information item that are modified by the change.

Standard No. 121, *Air Brake Systems*, is presently subject to judicial review under § 105(a) of the National Traffic and Motor Vehicle Safety Act (15 U.S.C. § 1394(a)). The U.S. Court of Appeals hearing the petition for review has indicated that it prefers to review the standard as it presently exists, without unnecessary amendment. To the degree possible, the agency is complying with that request and therefore, in the case of Standard No. 121, will delay the update of ASTM procedure until review is completed.

It is noted that this change in procedure for ascertaining the frictional resistance of the test surface does not invalidate data collected using the older procedure, and manufacturers can presumably certify on the basis of stopping distance tests conducted on surfaces measured by the old tire.

In consideration of the foregoing, amendments are made in Chapter V of Title 49, Code of Federal Regulations.

Effective date: June 14, 1976. Because the older test tire is no longer manufactured, and because the amendment of procedure and test tire is intended only to duplicate the existing procedure and tire, this amendment creates no additional requirements for any person, and an immediate effective date is found to be in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50.)

Issued on June 8, 1976.

James B. Gregory
Administrator

41 F.R. 24592
June 17, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75**Hydraulic Brake Systems****(Docket No. 75-27; Notice 4)**

This notice amends Standard No. 105-75, *Hydraulic Brake Systems*, and Standard No. 122, *Motorcycle Brake Systems*, to modify the means for establishing the frictional resistance of the surface on which stopping distance tests are conducted. A similar amendment is made to Part 575, *Consumer Information*, of Title 49 of the Code of Federal Regulations.

The National Highway Traffic Safety Administration (NHTSA) proposed the change in Standard No. 105-75 (49 CFR 571.105-75), Standard No. 121, *Air Brake Systems* (49 CFR 571.121), Standard No. 122 (49 CFR 571.122), and the Consumer Information Regulations (49 CFR 575.101) in response to a petition from British-Leyland Motors Limited (40 FR 45200, October 1, 1975). The existing test procedure in these regulations has specified use of the American Society for Testing and Materials (ASTM) E-274-65T procedure, using an ASTM E249 tire that is no longer manufactured.

Responses were received on the proposed ASTM change from White Motor Corporation (White), Mack Trucks, Inc. (Mack), Freightliner Corporation (Freightliner), Ford Motor Company (Ford), General Motors Corporation (GM), Chrysler Corporation (Chrysler), American Motors Corporation (AMC), and International Harvester (IH). The National Motor Vehicle Safety Advisory Council made no comment on the proposal.

Most commenters supported use of the new test procedure and tire, although they differed in recommendations for correlating the reading produced under the new procedure with that produced under the old procedure. Manufacturers are presently certifying compliance to brake standards on test surfaces with a satisfactory reading under the old procedure, and they should

be able to continue testing and certifying compliance on the same surface without any increase in the severity of the tests. To accomplish this transition, the correlation in readings between the procedures has been determined, and the difference is reflected in a change of the dry surface value from "skid number" 75 to "skid number" 81.

Freightliner urged postponement of any action until it could be supported by "adequate and statistically reliable test data." AMS also recommended that the NHTSA do nothing "until the industry has had sufficient time to evaluate and verify the performance of the ASTM E501 test tire on all types of surfaces."

The change in procedure is prompted by the ASTM decision to utilize a new tire in ascertaining the frictional coefficient of test surfaces. As a result the old tire is no longer manufactured and only the new tire is available for skid number measurement. Manufacturers have conducted comparative tests with the new tire to determine the correlation between the readings given by the two tires. Neither Freightliner nor AMC submitted data showing that the agency's proposal to adjust the dry surface skid number upwards is unjustified. Only Mack submitted data and it supported the NHTSA and Federal Highway Administration test data that have been placed in the docket. General Motors considered the agency's proposed upward adjustment to be the maximum desirable based on its data. International Harvester, Chrysler, and Ford supported the change in dry surface skid number without qualification, and White suggested that a skid number of 85 be utilized. The agency finds that the AMC and Freightliner requests for further delay are unjustified.

Ford and Freightliner asked that the skid number for the lower coefficient (wet) surface also be adjusted. The agency's purpose in proposing the adjustment is limited to changes necessary to avoid a modification of the test surfaces or an increase in the severity of performance levels specified under the safety standards. The NHTSA earlier concluded that change of the wet surface specification was unnecessary, and no evidence has been supplied that would modify the earlier determination.

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Freightliner asserted that the newer procedure included modification of a formula that justified a larger upwards adjustment than that proposed by the agency. Actually, the modifications only corrected an error in the earlier formula which had no effect on the determination of frictional coefficient. Manufacturers either utilized a test trailer that obviated the need for calculations using the formula, or were aware of the error and corrected for it in their calculations. Thus the adjustment requested by Freightliner is not warranted.

In accordance with recently-enunciated Department of Transportation policy encouraging adequate analysis of the consequences of regulatory action (41 FR 16201, April 16, 1976), the agency herewith summarizes its evaluation of the economic and other consequences of this amendment on the public and private sectors, including possible loss of safety benefit. Because the new references to procedures and a test tire are expected to accord with existing practices, the amendment is judged not to have any significant

impact on costs or benefits of the standards and consumer information item that are modified by the change.

Standard No. 121, *Air Brake Systems*, is presently subject to judicial review under § 105(a) of the National Traffic and Motor Vehicle Safety Act (15 U.S.C. § 1394(a)). The U.S. Court of Appeals hearing the petition for review has indicated that it prefers to review the standard as it presently exists, without unnecessary amendment. To the degree possible, the agency is complying with that request and therefore, in the case of Standard No. 121, will delay the update of ASTM procedure until review is completed.

It is noted that this change in procedure for ascertaining the frictional resistance of the test surface does not invalidate data collected using the older procedure, and manufacturers can presumably certify on the basis of stopping distance tests conducted on surfaces measured by the old tire.

In consideration of the foregoing, amendments are made in Chapter V of Title 49, Code of Federal Regulations.

Effective date: June 14, 1976. Because the older test tire is no longer manufactured, and because the amendment of procedure and test tire is intended only to duplicate the existing procedure and tire, this amendment creates no additional requirements for any person, and an immediate effective date is found to be in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50.)

Issued on June 8, 1976.

James B. Gregory
Administrator

41 F.R. 24592
June 17, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75

Hydraulic Brake Systems

(Docket Nos. 75-7; 75-16; Notices 3, 9)

This notice republishes in their entirety Standard No. 105-75, *Hydraulic Brake Systems*, and Standard No. 121, *Air Brake Systems*, because the number and complexity of recent amendments to these standards may have created confusion for some interested persons.

Standard No. 105-75 (49 CFR 571.105-75) was issued September 1972 (37 FR 17970, September 2, 1972) and has been amended numerous times since issuance. Although an up-to-date and complete text of the standard appears each year in the republished Code of Federal Regulations, several complex amendments have been made to the standard in the past year that are not reflected in the most recent up-to-date text. To assist interested persons who must be certain of the text's provisions, the agency herewith publishes the standard in its entirety. Interested persons are advised that amendments of Standard No. 105-75 may occur in the future, although no proposals are outstanding at this time.

In a related matter, General Motors Corporation has brought to the agency's attention an inadvertent deletion of one sentence from one section of Standard No. 105-75. A statement was added to the text of S5.1.5.2(a)(2) to permit an interim increase in permissible control force for the fifth wet recovery stop (40 FR 24525, June 9, 1975). Inadvertently, this sentence was deleted from S5.1.5.2(a)(2) in a subsequent rulemaking action (40 FR 42872, September 17, 1975), although the preamble to the notice made clear that "The new wording in no way modifies the meaning of S5.1.4(a)(2) and S5.1.5.2(a)(2)." To correct this omission, the sentence appears in this publication. It has

been moved to S5.1.5.2(a)(1) because it concerns the maximum pedal force limit in that section, rather than the minimum pedal force limit in S5.1.5.2(a)(2) where it appeared in the past.

Standard No. 121 (49 CFR 571.121) was issued in February 1971 (36 FR 3817, February 27, 1971) and has also been amended numerous times since issuance. Several amendments have occurred since the most recent publication of the standard in its entirety. For the reasons cited with regard to Standard No. 105-75, the agency herewith publishes the standard in its entirety. Interested persons are advised that three proposals to amend the standard are outstanding (40 FR 45200, October 1, 1975) (40 FR 56920, December 5, 1975) (41 FR 20706, May 20, 1976) and that amendments to the text of the standard may be made in the future.

It has also been noted that a clarification could be made to the language of S3 of the standard that excludes until September 1, 1977, vehicles that combine with other vehicles to form auto transporters. The temporary exclusion was added to the standard in January 1975 (40 FR 1246, January 7, 1975). To make the effect of that action more clear, the language in the second sentence of the text "or to any vehicle which" is changed in this republication to read "or that." This modification of the language has no effect on the requirements of this standard and notice and opportunity to comment are therefore found to be unnecessary.

In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) and Standard No. 121 (49 CFR 571.121) are republished to read as set forth below.

Effective: July 19, 1976

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718
(15 U.S.C. 1392, 1407) ; delegations of authority
at 49 CFR 1.50 and 49 CFR 501.8.)

Issued on June 30, 1976.

Robert L. Carter
Associate Administrator
Motor Vehicle Programs

41 F.R. 29696

July 19, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75

Hydraulic Brake Systems

(Docket Nos. 75-7; 75-16; Notices 3, 9)

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Standard No. 105-75 (49 CFR 571.105-75) was issued September 1972 (37 FR 17970, September 2, 1972) and has been amended numerous times since issuance. Although an up-to-date and complete text of the standard appears each year in the republished Code of Federal Regulations, several complex amendments have been made to the standard in the past year that are not reflected in the most recent up-to-date text. To assist interested persons who must be certain of the text's provisions, the agency herewith publishes the standard in its entirety. Interested persons are advised that amendments of Standard No. 105-75 may occur in the future, although no proposals are outstanding at this time.

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been moved to S5.1.5.2(a)(1) because it concerns the maximum pedal force limit in that section, rather than the minimum pedal force limit in S5.1.5.2(a)(2) where it appeared in the past.

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In consideration of the foregoing, Standard No. 105-75 (49 CFR 571.105-75) and Standard No. 121 (49 CFR 571.121) are republished to read as set forth below.

Effective: July 19, 1976

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718
(15 U.S.C. 1392, 1407) ; delegations of authority
at 49 CFR 1.50 and 49 CFR 501.8.)

Issued on June 30, 1976.

Robert L. Carter
Associate Administrator
Motor Vehicle Programs

41 F.R. 29696
July 19, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75

Hydraulic Brake Systems

(Docket No. 73-03; Notice 7); (Docket No. 73-20; Notice 10);

(Docket No. 73-34; Notice 4); (Docket No. 75-02; Notice 3);

(Docket No. 75-03; Notice 5); (Docket No. 75-07; Notice 3);

(Docket No. 75-24; Notice 3)

This notice announces that the effective dates of the redefinition of "school bus" and of six Federal motor vehicle safety standards as they apply to school buses are changed to April 1, 1977, from the previously established effective dates. This notice also makes a minor amendment to Standard No. 220, *School Bus Rollover Protection*, and adds a figure to Standard No. 221, *School Bus Body Joint Strength*.

The Motor Vehicle and Schoolbus Safety Amendments of 1974 (the Act) mandated the issuance of Federal motor vehicle safety standards for several aspects of school bus performance, Pub. L. 93-492, § 202 (15 U.S.C. § 1392 (i)(1)(A)). These amendments included a definition of school bus that necessitated a revision of the existing definition used by the NHTSA in establishing safety requirements. The Act also specified that the new requirements "apply to each schoolbus and item of schoolbus equipment which is manufactured . . . on or after the expiration of the 9-month period which begins on the date of promulgation of such safety standards." (15 U.S.C. § 1392(i)(1)(B)).

Pursuant to the Act, amendments were made to the following standards: Standard No. 301-75, *Fuel System Integrity* (49 CFR 571.301-75), effective July 15, 1976, for school buses not already covered by the standard (40 FR 483521, October 15, 1975); Standard No. 105-75, *Hydraulic Brake Systems* (49 CFR 571.105-75), effective October 12, 1976 (41 FR 2391, January 16, 1976); and Standard No. 217, *Bus Window Retention and Release* (49 CFR 571.217), effective

for school buses on October 26, 1976 (41 FR 3871, January 27, 1976).

In addition, the following new standards were added to Part 571 of Title 49 of the Code of Federal Regulations, effective October 26, 1976: Standard No. 220, *School Bus Rollover Protection* (41 FR 3874, January 27, 1976); Standard No. 221, *School Bus Body Joint Strength* (41 FR 3872, January 26, 1976); and Standard No. 222, *School Bus Passenger Seating and Crash Protection* (41 FR 4016, January 28, 1976). Also, the existing definition of "school bus" was amended, effective October 27, 1976, in line with the date set by the Act for issuance of the standards.

The Act was recently amended by Public Law 94-346 (July 8, 1976) to change the effective dates of the school bus standards to April 1, 1977 (15 U.S.C. § 1392(i)(1)(B)). This notice is intended to advise interested persons of these changes of effective dates. In the case of Standard No. 301-75, the change of effective date is reflected in a conforming amendment to S5.4 of that standard. A similar amendment is made in S3 of Standard No. 105-75.

The agency concludes that the October 27, 1976, effective date for the redefinition of "school bus" should be postponed to April 1, 1977, to conform to the new effective dates for the upcoming requirements. If this were not done, the new classes of school buses would be required to meet existing standards that apply to school buses (e.g., Standard No. 108 (49 CFR 571.108)) before being required to meet the new standards. This would result in two stages of compliance,

and would complicate the redesign efforts that Congress sought to relieve.

This notice also amends Standard No. 220 in response to an interpretation request by Blue Bird Body Company, and Sheller-Globe Corporation's petition for reconsideration of the standard. Both companies request confirmation that the standard's requirement to operate emergency exits during the application of force to the vehicle roof (S4(b)) does not apply to roof exits which are covered by the force application plate. The agency did not intend to require the operation of roof exits while the force application plate is in place on the vehicle. Accordingly, an appropriate amendment has been made to S4(b) of the standard.

With regard to Standard No. 220, Sheller-Globe also requested confirmation that, in testing its school buses that have a gross vehicle weight rating (GVWR) of 10,000 pounds or less, it may test with a force application plate with dimensions other than those specified in the standard. The standard does not prohibit a manufacturer from using a different dimension from that specified, in view of the NHTSA's expressed position on the legal effect of its regulations. To certify compliance, a manufacturer is free to choose any means, in the exercise of due care, to show that a vehicle (or item of motor vehicle equipment) would comply if tested by the NHTSA as specified in the standard. Thus the force application plate used by the NHTSA need not be duplicated by each manufacturer or compliance test facility. Sheller-Globe, for example, is free to use a force application plate of any width as long as it can certify its vehicle would comply if tested by the NHTSA according to the standard.

In a separate area, the agency corrects the inadvertent omission of an illustration from Standard No. 221 as it was issued January 26, 1976 (41 FR 3872). The figure does not differ from that proposed and, in that form, it received no adverse comment.

In accordance with recently-enunciated Department of Transportation policy encouraging

adequate analysis of the consequences of regulatory action (41 FR 16200, April 16, 1976), the agency herewith summarizes its evaluation of the economic and other consequences of this action on the public and private sectors, including possible loss of safety benefits. The changes in effective dates for the school bus standards are not evaluated because they were accomplished by law and not by regulatory action.

The change of effective date for the redefinition of "school bus" will result in savings to manufacturers who will not be required to meet existing school bus standards between October 27, 1976, and April 1, 1977. The agency calculates that the only standard that would not be met would be the requirement in Standard No. 108 for school bus marker lamps. In view of the agency's existing provision for the markings of eight school buses in Pupil Transportation Standard No. 17 (23 CFR 1204), it is concluded that the absence of this equipment until April 1, 1977, will not have a significant adverse impact on safety.

The interpretative amendment of Standard No. 220 and the addition of a figure to Standard No. 221 are not expected to affect the manufacture or operation of school buses.

In consideration of the foregoing, Part 571 of Title 49 of the Code of Federal Regulations is amended. . . .

Effective dates:

1. Because the listed amendments do not impose additional requirements of any person, the National Highway Traffic Safety Administration finds that an immediate effective date of August 20, 1976 is in the public interest.

2. The effective date of the redefinition of "school bus" in 49 CFR Part 571.3 that was published in the issue of December 31, 1976 (40 FR 60033) is changed to April 1, 1977.

3. The effective dates of Standard Nos. 105-75, 217, 301-75, 220, 221, and 222 (as they apply to school buses) are April 1, 1977, in accordance with Public Law 94-346.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); Pub. L. 94-346, Stat.

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 105-75

Hydraulic Brake Systems

(Docket No. 73-03; Notice 7); (Docket No. 73-20; Notice 10);

(Docket No. 73-34; Notice 4); (Docket No. 75-02; Notice 3);

(Docket No. 75-03; Notice 5); (Docket No. 75-07; Notice 3);

(Docket No. 75-24; Notice 3)

This notice announces that the effective dates of the redefinition of "school bus" and of six Federal motor vehicle safety standards as they apply to school buses are changed to April 1, 1977, from the previously established effective dates. This notice also makes a minor amendment to Standard No. 220, *School Bus Rollover Protection*, and adds a figure to Standard No. 221, *School Bus Body Joint Strength*.

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Pursuant to the Act, amendments were made to the following standards: Standard No. 301-75, *Fuel System Integrity* (49 CFR 571.301-75), effective July 15, 1976, for school buses not already covered by the standard (40 FR 483521, October 15, 1975); Standard No. 105-75, *Hydraulic Brake Systems* (49 CFR 571.105-75), effective October 12, 1976 (41 FR 2391, January 16, 1976); and Standard No. 217, *Bus Window Retention and Release* (49 CFR 571.217), effective

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The Act was recently amended by Public Law 94-346 (July 8, 1976) to change the effective dates of the school bus standards to April 1, 1977 (15 U.S.C. § 1392(i) (1) (B)). This notice is intended to advise interested persons of these changes of effective dates. In the case of Standard No. 301-75, the change of effective date is reflected in a conforming amendment to S5.4 of that standard. A similar amendment is made in S3 of Standard No. 105-75.

The agency concludes that the October 27, 1976, effective date for the redefinition of "school bus" should be postponed to April 1, 1977, to conform to the new effective dates for the upcoming requirements. If this were not done, the new classes of school buses would be required to meet existing standards that apply to school buses (e.g., Standard No. 108 (49 CFR 571.108)) before being required to meet the new standards. This would result in two stages of compliance,

and would complicate the redesign efforts that Congress sought to relieve.

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adequate analysis of the consequences of regulatory action (41 FR 16200, April 16, 1976), the agency herewith summarizes its evaluation of the economic and other consequences of this action on the public and private sectors, including possible loss of safety benefits. The changes in effective dates for the school bus standards are not evaluated because they were accomplished by law and not by regulatory action.

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In consideration of the foregoing, Part 571 of Title 49 of the Code of Federal Regulations is amended. . . .

Effective dates:

1. Because the listed amendments do not impose additional requirements of any person, the National Highway Traffic Safety Administration finds that an immediate effective date of August 20, 1976 is in the public interest.

2. The effective date of the redefinition of "school bus" in 49 CFR Part 571.3 that was published in the issue of December 31, 1976 (40 FR 60033) is changed to April 1, 1977.

3. The effective dates of Standard Nos. 105-75, 217, 301-75, 220, 221, and 222 (as they apply to school buses) are April 1, 1977, in accordance with Public Law 94-346.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); Pub. L. 94-346, Stat.

Effective: August 26, 1976

(15 U.S.C. § 1392(i)(1)(B)); delegation of
authority at 49 CFR 1.50.)

Issued on August 17, 1976.

John W. Snow
Administrator

41 F.R. 36026
August 26, 1976

Effective: August 26, 1976

(15 U.S.C. § 1392(i)(1)(B)); delegation of
authority at 49 CFR 1.50.)

Issued on August 17, 1976.

John W. Snow
Administrator

41 F.R. 36026
August 26, 1976

PREAMBLE TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 105-83

Hydraulic Brake Systems (Docket No. 70-27; Notice 20)

ACTION: Final rule.

SUMMARY: This notice amends Standard 105, Hydraulic Brake Systems. The standard currently applies to passenger cars and school buses. Its applicability is extended on a general basis (with some modifications) to trucks, all types of buses, and multipurpose passenger vehicles (MPV's) with a gross vehicle weight rating (GVWR) of 10,000 lbs. or less. Several requirements are also extended to trucks, buses and MPV's with a GVWR greater than 10,000 lbs. In addition, the standard's requirements for school buses are upgraded.

DATES: The effective date of this amendment is September 1, 1983.

ADDRESSES: Petitions for reconsideration should refer to the docket number and be submitted to: Docket Section, Room 5108, 400 Seventh Street, S.W., Washington, D.C. 20590.

FOR FURTHER INFORMATION CONTACT:

Mr. George L. Parker, Office of Vehicle Safety Standards, National Highway Traffic Safety Administration, 400 Seventh Street S.W., Washington D.C. 20590
(202-426-2720)

SUPPLEMENTARY INFORMATION: Standard 105, Hydraulic Brake Systems, currently applies to passenger cars and school buses. This notice extends its applicability on a general basis (with some modifications) to trucks, all types of buses, and multipurpose passenger vehicles (MPV's) with a gross vehicle weight rating (GVWR) of 10,000 lbs. or less. Several requirements are also extended to trucks, buses and MPV's with a GVWR greater than 10,000 lbs. In addition, the

standard's requirements for school buses are upgraded.

This final rule was preceded by a notice proposing the extension of Standard 105 in October 1979 (44 FR 60113). Private citizens, safety organizations, manufacturers, and manufacturer trade associations have submitted comments on the proposal. The NHTSA has considered all of those comments and the most significant ones are discussed below.

The agency made two significant modifications in the proposed standard's requirements as a result of the comments. As will be explained below, the agency determined that third effectiveness requirements should not be applicable to vehicles, other than school buses, with a GVWR of 8,000 to 10,000 lbs. Also, the agency determined that fourth effectiveness stopping distance requirements for vehicles with a GVWR of 8,000 to 10,000 lbs., as well as spike stop check stopping distance requirements for those vehicles, should be slightly relaxed.

The changes in the standard's requirements were made to give manufacturers additional leeway in balancing the performance of their vehicles' braking systems for both fully loaded and lightly loaded conditions and to ensure that the requirements would not result in unduly burdensome certification responsibilities being imposed on final stage manufacturers.

A slight change was also made in the standard's definition of "lightly loaded vehicle weight" to permit the use of additional instrumentation.

Also in response to the comments, the agency determined that a longer period of leadtime should be provided. The effective date of the requirements is September 1, 1983, which gives a leadtime of more than two years.

Many comments were received in support of

extending Standard 105 to to apply to trucks, all types of buses, and MPV's. General Motors, Chrysler and American Motors/Jeep all stated that they support the adoption of requirements for hydraulic braked trucks, buses and MPV's, though all three companies requested some modifications in the standard as proposed. Wagner Electric stated that it is commendable that efforts are being made to improve the safety of the highways and that it can see the benefits that may accrue when more varieties of highway vehicles have been brought under the control of the appropriate minimum braking standard.

Both Ford and the Japan Automobile Manufacturers Association stated that they are not opposed to the application of braking performance requirements to vehicles in addition to passenger cars and school buses. The Japan Automobile Manufacturers Association added that, from the viewpoint of safety, it thought this application should be promoted.

The National Transportation Safety Board stated that it supported the action, noting that by reducing the current disparity between the braking capability of passenger cars and many trucks and vans, motor vehicle accidents should be reduced. The Board also stated its support for the requirements upgrading the performance requirements for school buses.

While the General Accounting Office of the United States did not specifically comment on this rulemaking, a report to the United States Congress by the Comptroller General issued in 1978 called for, among other things, expeditious rulemaking on light truck braking performance. See Report to Congress by the Comptroller General of the United States, Unwarranted Delays by the Department of Transportation to Improve Light Truck Safety, July 6, 1978.

The Center for Auto Safety stated that extension of the standard is long overdue and is fully supported by the large number of consumer complaints that the Center received each year on inadequate brakes on light trucks, vans and MPV's.

Effectiveness Requirements

Comments received on the proposal's effectiveness requirements for service brake systems primarily dealt with the third and fourth effectiveness test stopping distances for vehicles with a GVWR of 8,000 to 10,000 lbs. Several comments

stated that the stopping distance requirements that were proposed were too stringent.

The fourth effectiveness test is an effectiveness test of the braking system which is conducted after the fade tests and while the vehicle is fully loaded. Because it comes after the fade tests, during which some deterioration of the brakes may occur, the fourth effectiveness test was considered by several commenters to be the most stringent of the fully loaded effectiveness tests. Generally discussed along with the fourth effectiveness test were the spike stop check stopping distance requirements. These requirements represent an abbreviated effectiveness test with the same stopping distance requirements as the fourth effectiveness test, which is conducted after the spike stops (which follow the fourth effectiveness test). Because the commenters addressed these tests together and because the stopping distance requirements are the same for the two tests, the discussion of these requirements will subsume the spike stop check stopping distance requirements into consideration of the fourth effectiveness stopping distance requirements.

According to the commenters, brakes which are powerful enough to meet the fourth effectiveness (fully loaded) stopping distance requirements for vehicles in that weight class would be prone to lockup in the lightly loaded condition. If lockup occurred in the lightly loaded condition, the vehicles would be unable to meet the third effectiveness (lightly loaded) stopping distance requirements. Several comments stated that manufacturers would find it necessary to develop anti-lock or similar devices in order to meet the requirements as proposed.

Other comments on the third and fourth effectiveness requirements for this class of vehicles focused on possible deleterious effects that the requirements might have on final stage manufacturers and the market which they serve. (A "final stage manufacturer" is a manufacturer which typically purchases an incomplete vehicle which usually consists only of a chassis, suspension, power train, brakes and perhaps an occupant compartment from an incomplete vehicle manufacturer such as Ford, General Motors or Chrysler and completes the vehicle by adding a body or work-performing equipment).

Any final stage manufacturer that does not

PREAMBLE TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 105-83

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SUMMARY: This notice amends Standard 105, Hydraulic Brake Systems. The standard currently applies to passenger cars and school buses. Its applicability is extended on a general basis (with some modifications) to trucks, all types of buses, and multipurpose passenger vehicles (MPV's) with a gross vehicle weight rating (GVWR) of 10,000 lbs. or less. Several requirements are also extended to trucks, buses and MPV's with a GVWR greater than 10,000 lbs. In addition, the standard's requirements for school buses are upgraded.

DATES: The effective date of this amendment is September 1, 1983.

ADDRESSES: Petitions for reconsideration should refer to the docket number and be submitted to: Docket Section, Room 5108, 400 Seventh Street, S.W., Washington, D.C. 20590.

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standard's requirements for school buses are upgraded.

This final rule was preceded by a notice proposing the extension of Standard 105 in October 1979 (44 FR 60113). Private citizens, safety organizations, manufacturers, and manufacturer trade associations have submitted comments on the proposal. The NHTSA has considered all of those comments and the most significant ones are discussed below.

The agency made two significant modifications in the proposed standard's requirements as a result of the comments. As will be explained below, the agency determined that third effectiveness requirements should not be applicable to vehicles, other than school buses, with a GVWR of 8,000 to 10,000 lbs. Also, the agency determined that fourth effectiveness stopping distance requirements for vehicles with a GVWR of 8,000 to 10,000 lbs., as well as spike stop check stopping distance requirements for those vehicles, should be slightly relaxed.

The changes in the standard's requirements were made to give manufacturers additional leeway in balancing the performance of their vehicles' braking systems for both fully loaded and lightly loaded conditions and to ensure that the requirements would not result in unduly burdensome certification responsibilities being imposed on final stage manufacturers.

A slight change was also made in the standard's definition of "lightly loaded vehicle weight" to permit the use of additional instrumentation.

Also in response to the comments, the agency determined that a longer period of leadtime should be provided. The effective date of the requirements is September 1, 1983, which gives a leadtime of more than two years.

Many comments were received in support of

extending Standard 105 to to apply to trucks, all types of buses, and MPV's. General Motors, Chrysler and American Motors/Jeep all stated that they support the adoption of requirements for hydraulic braked trucks, buses and MPV's, though all three companies requested some modifications in the standard as proposed. Wagner Electric stated that it is commendable that efforts are being made to improve the safety of the highways and that it can see the benefits that may accrue when more varieties of highway vehicles have been brought under the control of the appropriate minimum braking standard.

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Comments received on the proposal's effectiveness requirements for service brake systems primarily dealt with the third and fourth effectiveness test stopping distances for vehicles with a GVWR of 8,000 to 10,000 lbs. Several comments

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Other comments on the third and fourth effectiveness requirements for this class of vehicles focused on possible deleterious effects that the requirements might have on final stage manufacturers and the market which they serve. (A "final stage manufacturer" is a manufacturer which typically purchases an incomplete vehicle which usually consists only of a chassis, suspension, power train, brakes and perhaps an occupant compartment from an incomplete vehicle manufacturer such as Ford, General Motors or Chrysler and completes the vehicle by adding a body or work-performing equipment).

Any final stage manufacturer that does not

complete a vehicle in accordance with conditions established by the incomplete vehicle manufacturer must recertify that the completed vehicle complies with applicable safety standards based upon its own information, analysis, or tests. Several commenters were concerned that final stage manufacturers would not be able to meet those conditions and thus would be required to engage in extensive testing of their vehicles. According to those commenters, extensive testing is not feasible for final stage manufacturers as they are often small manufacturers that produce only limited numbers of a variety of specialty vehicles.

Changes suggested by the commenters varied, depending upon whether they were addressing the requirements from the point of view of the large manufacturers (i.e., the incomplete vehicle manufacturers) or the final stage manufacturers. General Motors, for example, stated that it could meet the longest of a range of stopping distances proposed for the third effectiveness test if fourth effectiveness test stopping distances were extended by 10 percent. Comments received from Ford and Chrysler were similar, with Ford asking for a relatively minor increase in third effectiveness stopping distances and a 10 percent increase in fourth effectiveness stopping distances, while Chrysler requested a 16 percent increase in stopping distances for fourth effectiveness tests.

Those commenters primarily concerned with final stage manufacturer certification difficulties suggested various approaches, including not extending Standard 105 at this time or only extending it to vehicles with a GVWR under 8,000 lbs. Other approaches suggested by those commenters include applying different test requirements to final stage manufacturers, so long as the braking systems on their vehicles are used on similar vehicles, requiring incomplete vehicle manufacturers to give additional information to final stage manufacturers to help them make engineering judgments about the effect changes in the center of gravity will have on a vehicle's braking ability, and providing a longer period of leadtime to final stage manufacturers than other manufacturers.

The latter approach was suggested because some final stage manufacturers were concerned that incomplete vehicle manufacturers would not provide information about new conditions established as a result of the proposed requirements

until just before the time of model introduction. According to those comments, final stage manufacturers need to receive such information well in advance of the time of model introduction in order that they can design their vehicles in accordance with the conditions.

The agency was aware of the braking design problems associated with trucks, buses and MPV's, including those particularly affecting vehicles over 8,000 lbs. GVWR, when it issued the proposal. The proposal explained that while trucks, buses and MPV's should ideally stop in as short a distance as passenger cars, since they share the same roads and traffic flow, there are certain differences between those vehicles which make accomplishing that goal more difficult for trucks, buses and MPV's. The primary differences are the greater loaded to empty-weight ratio of trucks, MPV's and buses, the higher center of gravity found in those vehicles (which results in greater dynamic weight transfer during braking), the greater variations in loaded and unloaded weight distribution that occur in those vehicles and the lower traction capabilities of truck tires. Because these factors make it difficult to design braking systems which provide the appropriate brake torque for each axle under all braking and load conditions, the agency proposed stopping distances that were slightly longer than those in effect for passenger cars.

The notice also discussed the design problems particularly affecting trucks, buses and MPV's with a GVWR over 8,000 lbs. In order to stop in as short a distance as lighter vehicles, vehicles with GVWR of 8,000 lbs. or more require powerful rear brakes to meet fully loaded stopping distance requirements. When the vehicles are stopped in a lightly loaded condition, however, the powerful rear brakes can cause wheel-lockup and resulting vehicle instability. Because of these design problems, the agency proposed ranges of slightly longer third effectiveness test stopping distances for vehicles with a GVWR of 8,000 to 10,000 lbs than for vehicles with lower GVWR. In proposing the requirements, the agency stated that it was its intention to avoid requiring manufacturers to develop anti-lock or similar devices for their vehicles. While such systems may be able to overcome these problems, there is no field-tested anti-lock system for hydraulic-braked vehicles that is commercially available at this time.

The stopping distances proposed for the third and fourth effectiveness tests were based upon tests conducted by the agency on existing production vehicles and upon confidential brake development test data submitted by General Motors, Ford and Chrysler. Based upon its analysis of these data, the agency concluded that the proposed stopping distances for both the third and fourth effectiveness tests for vehicles with a GVWR of 8,000 to 10,000 lbs., including vehicles with unusually high centers of gravity and with both short and long wheelbases (which typically are more difficult to design brakes for than other vehicles), could be met without anti-lock or similar devices. Instead, the requirements could be met by modifications to such vehicle components as brake linings, wheel cylinders, master cylinders, and combination valves.

This conclusion does not, however, fully resolve the concerns raised about the requirements as they relate to final stage manufacturers. As noted above, final stage manufacturers, typically purchase incomplete vehicles from large manufacturers and complete the vehicles, often for specialized needs. Since only a limited number of incomplete vehicle designs are available for purchase, a final stage manufacturer must use the same incomplete vehicle design for widely varying applications. A given incomplete vehicle design may be completed as a pickup, a recreational vehicle, or a high cube van. Diverse equipment may be added such as service cranes, lift gates, ladders, aerial devices, and snow plows. Assuming that a final stage manufacturer does not redesign the braking system for each different use, the braking system sold with the incomplete vehicle by its manufacturer must serve applications with widely varying centers of gravity (i.e., varying both vertically and horizontally).

The agency estimates that a 10 percent rise in center of gravity location will lengthen the stopping distance of a typical vehicle by three percent if it is operating at the limit of tire traction for its rear wheels. Changes in horizontal center of gravity will also lengthen stopping distances in some instances. It follows that a vehicle which would barely meet the requirements of the proposed standard at the specific center of gravity for which it is designed, which would be the case for some vehicles with a GVWR of 8,000 to 10,000 lbs., would not be able to meet the requirements at centers

of gravity widely varying from the design one.

The agency agrees, after analysis of the comments received from final stage manufacturers, their trade associations, and incomplete vehicle manufacturers, that the increased center of gravity limitations which might be established for some vehicles of 8,000 to 10,000 lbs. GVWR if the proposal were adopted would pose significant difficulties for final stage manufacturers. (Some limitations are currently established by incomplete vehicle manufacturers in connection with their certification of Standards 212, 219, and 301.) In some instances, a final stage manufacturer would be unable to simply complete vehicles on the same incomplete vehicle that it is accustomed to using, as the center of gravity of the completed vehicles would not be within the center of gravity envelope specified by the incomplete vehicle manufacturer.

The final stage manufacturer would be faced with buying the same incomplete vehicles as before and recertifying them and possibly redesigning their braking systems. Since the sales of incomplete vehicles to final stage manufacturers are a very small percentage of the light truck sales of the incomplete vehicle manufacturers, the incomplete vehicle manufacturers are not likely to be willing to accommodate the final stage manufacturers by making major modifications to the line of incomplete vehicles they offer for sale, such as providing incomplete vehicles which are designed for a broader range of centers of gravity. The incomplete vehicle manufacturers have themselves indicated this reluctance in a number of rulemakings.

The agency has dealt with the certification problems of final stage manufacturers during other rulemaking proceedings. Since final stage manufacturers are often very small companies, which produce limited numbers of speciality vehicles, they often have limited resources for redesigning their vehicles, testing their vehicles for compliance with applicable safety standards, or making engineering judgments about the effect changes in a vehicle's center of gravity will have on the vehicle's performance. Therefore, the agency has sought to limit, consistent with the needs of safety, the compliance burdens on final stage manufacturers.

For example, the agency established special provisions affording relief to final stage manufac-

complete a vehicle in accordance with conditions established by the incomplete vehicle manufacturer must recertify that the completed vehicle complies with applicable safety standards based upon its own information, analysis, or tests. Several commenters were concerned that final stage manufacturers would not be able to meet those conditions and thus would be required to engage in extensive testing of their vehicles. According to those commenters, extensive testing is not feasible for final stage manufacturers as they are often small manufacturers that produce only limited numbers of a variety of specialty vehicles.

Changes suggested by the commenters varied, depending upon whether they were addressing the requirements from the point of view of the large manufacturers (i.e., the incomplete vehicle manufacturers) or the final stage manufacturers. General Motors, for example, stated that it could meet the longest of a range of stopping distances proposed for the third effectiveness test if fourth effectiveness test stopping distances were extended by 10 percent. Comments received from Ford and Chrysler were similar, with Ford asking for a relatively minor increase in third effectiveness stopping distances and a 10 percent increase in fourth effectiveness stopping distances, while Chrysler requested a 16 percent increase in stopping distances for fourth effectiveness tests.

Those commenters primarily concerned with final stage manufacturer certification difficulties suggested various approaches, including not extending Standard 105 at this time or only extending it to vehicles with a GVWR under 8,000 lbs. Other approaches suggested by those commenters include applying different test requirements to final stage manufacturers, so long as the braking systems on their vehicles are used on similar vehicles, requiring incomplete vehicle manufacturers to give additional information to final stage manufacturers to help them make engineering judgments about the effect changes in the center of gravity will have on a vehicle's braking ability, and providing a longer period of leadtime to final stage manufacturers than other manufacturers.

The latter approach was suggested because some final stage manufacturers were concerned that incomplete vehicle manufacturers would not provide information about new conditions established as a result of the proposed requirements

until just before the time of model introduction. According to those comments, final stage manufacturers need to receive such information well in advance of the time of model introduction in order that they can design their vehicles in accordance with the conditions.

The agency was aware of the braking design problems associated with trucks, buses and MPV's, including those particularly affecting vehicles over 8,000 lbs. GVWR, when it issued the proposal. The proposal explained that while trucks, buses and MPV's should ideally stop in as short a distance as passenger cars, since they share the same roads and traffic flow, there are certain differences between those vehicles which make accomplishing that goal more difficult for trucks, buses and MPV's. The primary differences are the greater loaded to empty-weight ratio of trucks, MPV's and buses, the higher center of gravity found in those vehicles (which results in greater dynamic weight transfer during braking), the greater variations in loaded and unloaded weight distribution that occur in those vehicles and the lower traction capabilities of truck tires. Because these factors make it difficult to design braking systems which provide the appropriate brake torque for each axle under all braking and load conditions, the agency proposed stopping distances that were slightly longer than those in effect for passenger cars.

The notice also discussed the design problems particularly affecting trucks, buses and MPV's with a GVWR over 8,000 lbs. In order to stop in as short a distance as lighter vehicles, vehicles with GVWR of 8,000 lbs. or more require powerful rear brakes to meet fully loaded stopping distance requirements. When the vehicles are stopped in a lightly loaded condition, however, the powerful rear brakes can cause wheel-lockup and resulting vehicle instability. Because of these design problems, the agency proposed ranges of slightly longer third effectiveness test stopping distances for vehicles with a GVWR of 8,000 to 10,000 lbs than for vehicles with lower GVWR. In proposing the requirements, the agency stated that it was its intention to avoid requiring manufacturers to develop anti-lock or similar devices for their vehicles. While such systems may be able to overcome these problems, there is no field-tested anti-lock system for hydraulic-braked vehicles that is commercially available at this time.

The stopping distances proposed for the third and fourth effectiveness tests were based upon tests conducted by the agency on existing production vehicles and upon confidential brake development test data submitted by General Motors, Ford and Chrysler. Based upon its analysis of these data, the agency concluded that the proposed stopping distances for both the third and fourth effectiveness tests for vehicles with a GVWR of 8,000 to 10,000 lbs., including vehicles with unusually high centers of gravity and with both short and long wheelbases (which typically are more difficult to design brakes for than other vehicles), could be met without anti-lock or similar devices. Instead, the requirements could be met by modifications to such vehicle components as brake linings, wheel cylinders, master cylinders, and combination valves.

This conclusion does not, however, fully resolve the concerns raised about the requirements as they relate to final stage manufacturers. As noted above, final stage manufacturers, typically purchase incomplete vehicles from large manufacturers and complete the vehicles, often for specialized needs. Since only a limited number of incomplete vehicle designs are available for purchase, a final stage manufacturer must use the same incomplete vehicle design for widely varying applications. A given incomplete vehicle design may be completed as a pickup, a recreational vehicle, or a high cube van. Diverse equipment may be added such as service cranes, lift gates, ladders, aerial devices, and snow plows. Assuming that a final stage manufacturer does not redesign the braking system for each different use, the braking system sold with the incomplete vehicle by its manufacturer must serve applications with widely varying centers of gravity (i.e., varying both vertically and horizontally).

The agency estimates that a 10 percent rise in center of gravity location will lengthen the stopping distance of a typical vehicle by three percent if it is operating at the limit of tire traction for its rear wheels. Changes in horizontal center of gravity will also lengthen stopping distances in some instances. It follows that a vehicle which would barely meet the requirements of the proposed standard at the specific center of gravity for which it is designed, which would be the case for some vehicles with a GVWR of 8,000 to 10,000 lbs., would not be able to meet the requirements at centers

of gravity widely varying from the design one.

The agency agrees, after analysis of the comments received from final stage manufacturers, their trade associations, and incomplete vehicle manufacturers, that the increased center of gravity limitations which might be established for some vehicles of 8,000 to 10,000 lbs. GVWR if the proposal were adopted would pose significant difficulties for final stage manufacturers. (Some limitations are currently established by incomplete vehicle manufacturers in connection with their certification of Standards 212, 219, and 301.) In some instances, a final stage manufacturer would be unable to simply complete vehicles on the same incomplete vehicle that it is accustomed to using, as the center of gravity of the completed vehicles would not be within the center of gravity envelope specified by the incomplete vehicle manufacturer.

The final stage manufacturer would be faced with buying the same incomplete vehicles as before and recertifying them and possibly redesigning their braking systems. Since the sales of incomplete vehicles to final stage manufacturers are a very small percentage of the light truck sales of the incomplete vehicle manufacturers, the incomplete vehicle manufacturers are not likely to be willing to accommodate the final stage manufacturers by making major modifications to the line of incomplete vehicles they offer for sale, such as providing incomplete vehicles which are designed for a broader range of centers of gravity. The incomplete vehicle manufacturers have themselves indicated this reluctance in a number of rulemakings.

The agency has dealt with the certification problems of final stage manufacturers during other rulemaking proceedings. Since final stage manufacturers are often very small companies, which produce limited numbers of speciality vehicles, they often have limited resources for redesigning their vehicles, testing their vehicles for compliance with applicable safety standards, or making engineering judgments about the effect changes in a vehicle's center of gravity will have on the vehicle's performance. Therefore, the agency has sought to limit, consistent with the needs of safety, the compliance burdens on final stage manufacturers.

For example, the agency established special provisions affording relief to final stage manufac-

turers in Standards 212, Windshield Mounting, and 219, Windshield Zone Intrusion. See notice of Final Rule, published in the *Federal Register* (45 FR 22044) on April 3, 1980. One of the final stage manufacturer problems that was addressed in that rulemaking proceeding was center of gravity limitations established by incomplete vehicle manufacturers. The agency added the special provisions to Standards 212 and 219 for the purpose of inducing the reduction of center of gravity restrictions placed on final stage manufacturers by incomplete vehicle manufacturers.

In order to ease the certification problems of final stage manufacturers that are related to Standard 105, while providing the maximum safety benefits that are consistent with that objective, the agency determined that third effectiveness requirements should not apply to vehicles, other than school buses, with a GVWR of 8,000 to 10,000 lbs. The problem of center of gravity limitations as it relates to the proposed test requirements is primarily limited to the third effectiveness (lightly loaded) test. Since the test is conducted while the vehicle is in an unloaded condition, the manufacturer is constrained to test at the vehicle's center of gravity of the vehicle as configured. Center of gravity is not a serious problem for the other effectiveness tests, which are conducted at GVWR. For those tests, the manufacturer may load the vehicle in a way so as to lower the center of gravity and make compliance easier.

In order to provide manufacturers with some additional leeway in balancing the performance of their braking systems for both fully loaded and lightly loaded conditions, the agency also decided that the fourth effectiveness (fully loaded) stopping distances should be extended by approximately 10 percent for the 8,000 to 10,000 lb. GVWR vehicles. As noted above, if fourth effectiveness requirements are too stringent, vehicles would need overly powerful rear brakes that are prone to lock-up in the lightly loaded condition. The agency recognizes that it is more difficult to meet the proposed fourth effectiveness requirements for this class of vehicles without producing vehicles that are prone to lock-up, though, as indicated above, test data indicate that it can be accomplished. The relaxation of the fourth effectiveness requirements will assure that the manufacturers can use braking systems that

perform well in the lightly loaded condition.

In making these modifications to the proposed requirements for vehicles with a GVWR of 8,000 to 10,000 lbs., the agency decided that school buses within that weight class should be treated separately. School buses are already required to meet Standard 105's requirements, though the October 1979 notice proposed making the requirements more stringent. As will be explained below, the agency decided that the proposal's fourth effectiveness requirements for school buses with a GVWR of 8,000 to 10,000 lbs. should be extended by 10 percent (the same as other vehicles within that weight class), with the exception of the 30 mph test. The agency also decided that third effectiveness stopping distance requirements, at the longest distances proposed, should be applicable to school buses.

Since school buses are already covered by Standard 105, the agency has a great deal of test data indicating their braking capability. Because school buses with a GVWR of 8,000 to 10,000 lbs. share most of the same characteristics as other vehicles with the same weight, the agency decided that fully loaded effectiveness requirements should be the same for school buses as for other vehicles, with the one exception referred to above. School buses are already required to meet slightly more stringent requirements for fully loaded tests at 30 mph. Therefore, the agency will not relax those requirements. For fully loaded tests at other speeds, the requirements are more stringent than those currently in effect.

As noted above, both agency test data and several comments indicate that the proposed third effectiveness test requirements (at the longest stopping distances proposed) can be met by vehicles with a GVWR of 8,000 to 10,000 lbs., particularly when the proposed fourth effectiveness stopping distances are slightly relaxed. The agency's decision that third effectiveness test requirements should not be applicable to vehicles with a GVWR of 8,000 to 10,000 lbs. resulted from possible center of gravity conditions that incomplete vehicle manufacturers might establish for the use of their vehicles. Since school buses do not have high centers of gravity or widely varying horizontal centers of gravity, they do not pose the same problems for final stage manufacturers as other vehicles. Moreover, since completing a vehicle as a school bus adds

weight to the rear axle, the lightly loaded effectiveness test is more easily met by school buses than many other vehicles. The comments received that related to third effectiveness tests and final stage manufacturer difficulties did not identify the requirements for school buses as creating difficulties. Therefore, based upon a detailed analysis of test data, manufacturer-supplied information, and the comments, as well as on the safety need associated with school buses, the agency decided that third effectiveness test requirements should apply to school buses with a GVWR of 8,000 to 10,000 lbs.

The agency believes that the modifications in the standard that were discussed above will eliminate any possibility that incomplete vehicle manufacturers will find it necessary either to establish more stringent center of gravity limitations on the use of their incomplete vehicles or to develop anti-lock or similar devices in order to be able to continue to produce incomplete vehicles that comply with the standard for the range of applications needed by final stage manufacturers. Final stage manufacturers, therefore, will ordinarily be able to rely on the incomplete vehicle manufacturer's certification of the braking system.

In some rare cases, such as when a final stage manufacturer adds an axle or redesigns the braking system of an incomplete vehicle, the final stage manufacturer will be required to recertify that the completed vehicle complies with the brake requirements. Depending upon the changes made, the final stage manufacturer may be able to certify based upon engineering judgments. If testing is required, the agency estimates that the costs of a full test sequence would be approximately \$2,500, assuming that the manufacturer has no facilities, instrumentation or test personnel of its own. Testing would not have to be conducted for each vehicle, but only for each vehicle type or, in some cases, the most problem prone configuration of several vehicle types. There are several test facilities and testing organizations distributed throughout the United States.

Such major changes are rarely made by final stage manufacturers, and, if they are, they tend to be made by the larger of these manufacturers. When such changes are made, the agency believes it appropriate to require that the manufacturer making those changes ensure that

the vehicle still complies with applicable Federal motor vehicle safety standards.

In adopting these changes, the agency followed, in part, the suggestions of several of the commenters. The National Truck Equipment Association (NTEA), for example, suggested that if the agency extends the standard at this time, it should select 8,000 lbs. GVWR as the cutoff weight for Standard 105. That cutoff was said to address the brake proportioning difficulties inherent in vehicles with a wide weight differential in their laden and unladen conditions. The agency declined to completely exempt vehicles of 8,000 lbs. or greater GVWR from Standard 105's coverage, since the standard offers many benefits in addition to those resulting from the requirements that would cause difficulties for final stage manufacturers. However, the agency did use 8,000 lbs. GVWR as the cutoff weight for the standard's third effectiveness requirements, the requirements which most directly relate to the brake proportioning difficulties referred to by NTEA.

The agency followed the suggestions of several incomplete vehicle manufacturers and other commenters also in deciding to relax fourth effectiveness stopping distance requirements for 8,000 to 10,000 lb. GVWR vehicles. Since the agency concluded that the requirements could be met as proposed without anti-lock or similar devices, albeit with some difficulty, the agency declined to adopt Chrysler's suggestion of a 16 percent extension and instead chose the 10 percent extension suggested by other comments. The agency decided, based on test data, that a 10 percent extension would be sufficient to make it easier for manufacturers to assure that their vehicles' braking systems perform well in both fully loaded and lightly loaded conditions.

The agency considered and rejected the alternative of adopting different test requirements for final stage manufacturers or providing final stage manufacturers with a longer period of leadtime than other manufacturers. Either approach would result in a safety standard that was applied on the basis of the particular manufacturer of a vehicle rather than the safety needs of a particular vehicle type. The National Traffic and Motor Vehicle Safety Act contemplates the application of standards based on vehicle type rather than by manufacturer. Further, the agency determined

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In order to ease the certification problems of final stage manufacturers that are related to Standard 105, while providing the maximum safety benefits that are consistent with that objective, the agency determined that third effectiveness requirements should not apply to vehicles, other than school buses, with a GVWR of 8,000 to 10,000 lbs. The problem of center of gravity limitations as it relates to the proposed test requirements is primarily limited to the third effectiveness (lightly loaded) test. Since the test is conducted while the vehicle is in an unloaded condition, the manufacturer is constrained to test at the vehicle's center of gravity of the vehicle as configured. Center of gravity is not a serious problem for the other effectiveness tests, which are conducted at GVWR. For those tests, the manufacturer may load the vehicle in a way so as to lower the center of gravity and make compliance easier.

In order to provide manufacturers with some additional leeway in balancing the performance of their braking systems for both fully loaded and lightly loaded conditions, the agency also decided that the fourth effectiveness (fully loaded) stopping distances should be extended by approximately 10 percent for the 8,000 to 10,000 lb. GVWR vehicles. As noted above, if fourth effectiveness requirements are too stringent, vehicles would need overly powerful rear brakes that are prone to lock-up in the lightly loaded condition. The agency recognizes that it is more difficult to meet the proposed fourth effectiveness requirements for this class of vehicles without producing vehicles that are prone to lock-up, though, as indicated above, test data indicate that it can be accomplished. The relaxation of the fourth effectiveness requirements will assure that the manufacturers can use braking systems that

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As noted above, both agency test data and several comments indicate that the proposed third effectiveness test requirements (at the longest stopping distances proposed) can be met by vehicles with a GVWR of 8,000 to 10,000 lbs., particularly when the proposed fourth effectiveness stopping distances are slightly relaxed. The agency's decision that third effectiveness test requirements should not be applicable to vehicles with a GVWR of 8,000 to 10,000 lbs. resulted from possible center of gravity conditions that incomplete vehicle manufacturers might establish for the use of their vehicles. Since school buses do not have high centers of gravity or widely varying horizontal centers of gravity, they do not pose the same problems for final stage manufacturers as other vehicles. Moreover, since completing a vehicle as a school bus adds

weight to the rear axle, the lightly loaded effectiveness test is more easily met by school buses than many other vehicles. The comments received that related to third effectiveness tests and final stage manufacturer difficulties did not identify the requirements for school buses as creating difficulties. Therefore, based upon a detailed analysis of test data, manufacturer-supplied information, and the comments, as well as on the safety need associated with school buses, the agency decided that third effectiveness test requirements should apply to school buses with a GVWR of 8,000 to 10,000 lbs.

The agency believes that the modifications in the standard that were discussed above will eliminate any possibility that incomplete vehicle manufacturers will find it necessary either to establish more stringent center of gravity limitations on the use of their incomplete vehicles or to develop anti-lock or similar devices in order to be able to continue to produce incomplete vehicles that comply with the standard for the range of applications needed by final stage manufacturers. Final stage manufacturers, therefore, will ordinarily be able to rely on the incomplete vehicle manufacturer's certification of the braking system.

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the vehicle still complies with applicable Federal motor vehicle safety standards.

In adopting these changes, the agency followed, in part, the suggestions of several of the commenters. The National Truck Equipment Association (NTEA), for example, suggested that if the agency extends the standard at this time, it should select 8,000 lbs. GVWR as the cutoff weight for Standard 105. That cutoff was said to address the brake proportioning difficulties inherent in vehicles with a wide weight differential in their laden and unladen conditions. The agency declined to completely exempt vehicles of 8,000 lbs. or greater GVWR from Standard 105's coverage, since the standard offers many benefits in addition to those resulting from the requirements that would cause difficulties for final stage manufacturers. However, the agency did use 8,000 lbs. GVWR as the cutoff weight for the standard's third effectiveness requirements, the requirements which most directly relate to the brake proportioning difficulties referred to by NTEA.

The agency followed the suggestions of several incomplete vehicle manufacturers and other commenters also in deciding to relax fourth effectiveness stopping distance requirements for 8,000 to 10,000 lb. GVWR vehicles. Since the agency concluded that the requirements could be met as proposed without anti-lock or similar devices, albeit with some difficulty, the agency declined to adopt Chrysler's suggestion of a 16 percent extension and instead chose the 10 percent extension suggested by other comments. The agency decided, based on test data, that a 10 percent extension would be sufficient to make it easier for manufacturers to assure that their vehicles' braking systems perform well in both fully loaded and lightly loaded conditions.

The agency considered and rejected the alternative of adopting different test requirements for final stage manufacturers or providing final stage manufacturers with a longer period of leadtime than other manufacturers. Either approach would result in a safety standard that was applied on the basis of the particular manufacturer of a vehicle rather than the safety needs of a particular vehicle type. The National Traffic and Motor Vehicle Safety Act contemplates the application of standards based on vehicle type rather than by manufacturer. Further, the agency determined

that the requirements as adopted, including lead-time, are appropriate for all manufacturers. Since incomplete vehicle manufacturers should not find it necessary to place significant new restrictions on the use of their chassis as a result of Standard 105, final stage manufacturers should not require any redesign of their vehicles.

While the standard's requirements have been relaxed to reduce certification burdens on final stage manufacturers and to make it easier for manufacturers to assure that their vehicles' braking systems are balanced for both lightly loaded and fully loaded conditions, the agency encourages manufacturers to recognize the safety advantages offered by better braking systems and, where possible, to produce vehicles which meet or exceed the more stringent requirements that were proposed.

A number of more general comments were received on the appropriateness of the 8,000 lb. GVWR boundary. American Motors/Jeep stated that it supported adoption of the 8,000 lb. GVWR cutoff as a reasonable first step in addressing the brake proportioning difficulties inherent in vehicles with a wide weight differential between their loaded and unloaded conditions. However, the commenter suggested that the agency investigate the feasibility of developing new criteria that respond directly to the laden to unladen ratio regardless of the vehicle's GVWR. Other comments, including those of General Motors, the Motor Vehicle Manufacturer's Association, Wagner Electric and NTEA also suggested that the agency consider an approach using a laden/unladen weight distribution ratio criterion. Several of those commenters emphasized that as vehicle downsizing continues, vehicles with a GVWR of under 8,000 lbs. will have the same balance problems as vehicles of 8,000 to 10,000 lbs. GVWR.

The agency recognizes that this may become a problem in the future, but only if manufacturers seek to hold GVWR constant as they downsize their fleets rather than keeping payload constant. Since the agency believes payload to be a better measure of a vehicle's utility than GVWR, the agency encourages manufacturers to keep a constant payload instead of a constant GVWR as they downsize their vehicles. The agency will monitor developments in this area.

A comment submitted by Daimler-Benz stated

that it saw no justification for an additional weight class of 8,000 to 10,000 lbs. GVWR and suggested that those vehicles be included with vehicles over 10,000 lbs. GVWR. According to that commenter, the brake regulations of some countries have a 3,500 kilogram (7716 lb.) weight limit, and some design characteristics of vehicles over 10,000 lbs. GVWR can also be found on vehicles with a GVWR of 8,000 lbs. As noted in the October 1979 notice, the agency is considering establishing more complete brake requirements for vehicles with a GVWR of over 10,000 lbs. but has not yet done so. This final rule brings the more complete requirements of Standard 105 to vehicles with a GVWR of 8,000 to 10,000 lbs. and includes requirements that are appropriate for all vehicles in that class, whatever their design characteristics.

As noted above, the comments concerning effectiveness requirements were largely directed at the requirements for vehicles with a GVWR of 8,000 to 10,000 lbs. However, some of the comments, including those of Chrysler and Wagner Electric, were also directed toward the fourth effectiveness requirements in general. Both the agency's own tests and confidential data submitted by the manufacturers indicate that recent models of almost all vehicles under 8,000 lbs. GVWR pass the effectiveness requirements. For any vehicles that do not, only minor changes would be required. As discussed above, it is easier to design braking systems for these vehicles than larger vehicles since they do not have as wide a weight differential between their loaded and unloaded conditions. Moreover, the type of work-performing equipment that can create center of gravity problems for final stage manufacturers is generally installed on vehicles with a GVWR of 8,000 lbs. or more. Therefore, no changes were made in the requirements as proposed for vehicles with a GVWR of under 8,000 lbs.

Comments submitted by Ford and Chrysler requested that both second and fourth effectiveness tests at 80 mph be eliminated in light of the 55 mph national speed limit. Ford also noted that actions required for fuel economy decrease the maximum speed capability of vehicles. The standard is written to require that the 80 mph test be met only if vehicles are capable of attaining a speed of 84 mph. Therefore, vehicles which cannot attain

that speed need not comply with the 80 mph requirements. Since many vehicles can attain speeds well in excess of 80 mph and some vehicles are at times driven at those high speeds, despite the 55 mph national speed limit, the agency believes that 80 mph requirements are appropriate and in the interest of safety.

Fade Recovery; Water Recovery

The October 1979 notice explained that the fade and recovery requirements were included to assure that a vehicle's braking performance is satisfactory when exposed to the high brake temperatures caused by prolonged or severe use, such as is found in long, downhill driving. The proposal requires that vehicles be capable of passing two successive fade and recovery tests. The water recovery requirements assure that a vehicle's braking system performs adequately after immersion in water.

The comments on these tests were limited to the fade and recovery requirements. Chrysler stated that the fade tests simulate abuse that is rarely, if ever, encountered in actual customer service. That commenter stated that the fade tests, coupled with the fourth effectiveness requirements which follow the fade tests, would result in braking systems that are biased toward the rear brakes. According to Chrysler, rear biased brakes would be prone to lock-up in the lightly loaded condition. Wagner Electric submitted a similar comment and suggested that the second fade and recovery test and the fourth effectiveness test were redundant. That commenter suggested that those two tests be eliminated to simplify the test procedures of Standard 105.

The concern that the test requirements would result in braking systems biased toward the rear brakes was largely discussed in the preceding section of this notice. The proposed requirements of Standard 105 included both fully loaded and lightly loaded tests. The agency concluded, based upon its own vehicle tests and on information submitted by manufacturers, that the proposed test requirements could be met by changes in various braking system components. So long as both fully loaded and lightly loaded requirements were met, the braking system would be properly balanced for both fully loaded and lightly loaded conditions. By extending the fourth effectiveness requirements by 10 percent for vehicles with a

GVWR of 8,000 to 10,000 lbs., additional leeway was provided to manufacturers in designing their braking systems to be properly balanced. As noted above, no changes were made in the requirements applicable to vehicles with a GVWR of under 8,000 lbs., since recent models of most of those vehicles already pass the effectiveness requirements. Only minor changes are required for those vehicles that do not.

The two fade tests were designed to produce first a mild to moderate fade condition and then a more severe fade condition. Light fade occurs in vehicles even in low speed applications such as in heavy traffic. Moderate to severe fade is a condition that may occur when vehicles are used on hilly or mountainous roads, especially when heavy loads are carried. Far from being redundant, the second fade test simulates the type of fade experienced during long mountain descents. The agency has verified that the temperatures produced by the test sequence are the same temperatures as sometimes experienced during long mountain descents. The fade and recovery test requirements assure that brakes do not perform abnormally while subject to the heat caused by severe use or during the time that the brakes are cooling off after severe use.

The fourth effectiveness test is a complete effectiveness test that is conducted after most of the other tests, including the fade tests, have been completed. This test is included to give an overall system evaluation to assure that a braking system retains satisfactory characteristics related to effectiveness, pedal force, and sensitivity after exposure to the types of conditions simulated during the test sequence.

A comment submitted by the American Trucking Associations (ATA) suggested that the proposed fade requirements are severe enough to adversely affect user acceptance in normal service. According to ATA, compromises in such things as loss of feel and hard pedal in order to achieve greater fade resistance may be necessary. The comment also suggested that fade resistance tests developed in the past may be outdated as vehicles are becoming less powerful.

The agency tested a number of production vehicles before proposing the fade requirements and found that almost all of them met the requirements. The only vehicles tested by the agency which appeared to present problems were

that the requirements as adopted, including lead-time, are appropriate for all manufacturers. Since incomplete vehicle manufacturers should not find it necessary to place significant new restrictions on the use of their chassis as a result of Standard 105, final stage manufacturers should not require any redesign of their vehicles.

While the standard's requirements have been relaxed to reduce certification burdens on final stage manufacturers and to make it easier for manufacturers to assure that their vehicles' braking systems are balanced for both lightly loaded and fully loaded conditions, the agency encourages manufacturers to recognize the safety advantages offered by better braking systems and, where possible, to produce vehicles which meet or exceed the more stringent requirements that were proposed.

A number of more general comments were received on the appropriateness of the 8,000 lb. GVWR boundary. American Motors/Jeep stated that it supported adoption of the 8,000 lb. GVWR cutoff as a reasonable first step in addressing the brake proportioning difficulties inherent in vehicles with a wide weight differential between their loaded and unloaded conditions. However, the commenter suggested that the agency investigate the feasibility of developing new criteria that respond directly to the laden to unladen ratio regardless of the vehicle's GVWR. Other comments, including those of General Motors, the Motor Vehicle Manufacturer's Association, Wagner Electric and NTEA also suggested that the agency consider an approach using a laden/unladen weight distribution ratio criterion. Several of those commenters emphasized that as vehicle downsizing continues, vehicles with a GVWR of under 8,000 lbs. will have the same balance problems as vehicles of 8,000 to 10,000 lbs. GVWR.

The agency recognizes that this may become a problem in the future, but only if manufacturers seek to hold GVWR constant as they downsize their fleets rather than keeping payload constant. Since the agency believes payload to be a better measure of a vehicle's utility than GVWR, the agency encourages manufacturers to keep a constant payload instead of a constant GVWR as they downsize their vehicles. The agency will monitor developments in this area.

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As noted above, the comments concerning effectiveness requirements were largely directed at the requirements for vehicles with a GVWR of 8,000 to 10,000 lbs. However, some of the comments, including those of Chrysler and Wagner Electric, were also directed toward the fourth effectiveness requirements in general. Both the agency's own tests and confidential data submitted by the manufacturers indicate that recent models of almost all vehicles under 8,000 lbs. GVWR pass the effectiveness requirements. For any vehicles that do not, only minor changes would be required. As discussed above, it is easier to design braking systems for these vehicles than larger vehicles since they do not have as wide a weight differential between their loaded and unloaded conditions. Moreover, the type of work-performing equipment that can create center of gravity problems for final stage manufacturers is generally installed on vehicles with a GVWR of 8,000 lbs. or more. Therefore, no changes were made in the requirements as proposed for vehicles with a GVWR of under 8,000 lbs.

Comments submitted by Ford and Chrysler requested that both second and fourth effectiveness tests at 80 mph be eliminated in light of the 55 mph national speed limit. Ford also noted that actions required for fuel economy decrease the maximum speed capability of vehicles. The standard is written to require that the 80 mph test be met only if vehicles are capable of attaining a speed of 84 mph. Therefore, vehicles which cannot attain

that speed need not comply with the 80 mph requirements. Since many vehicles can attain speeds well in excess of 80 mph and some vehicles are at times driven at those high speeds, despite the 55 mph national speed limit, the agency believes that 80 mph requirements are appropriate and in the interest of safety.

Fade Recovery; Water Recovery

The October 1979 notice explained that the fade and recovery requirements were included to assure that a vehicle's braking performance is satisfactory when exposed to the high brake temperatures caused by prolonged or severe use, such as is found in long, downhill driving. The proposal requires that vehicles be capable of passing two successive fade and recovery tests. The water recovery requirements assure that a vehicle's braking system performs adequately after immersion in water.

The comments on these tests were limited to the fade and recovery requirements. Chrysler stated that the fade tests simulate abuse that is rarely, if ever, encountered in actual customer service. That commenter stated that the fade tests, coupled with the fourth effectiveness requirements which follow the fade tests, would result in braking systems that are biased toward the rear brakes. According to Chrysler, rear biased brakes would be prone to lock-up in the lightly loaded condition. Wagner Electric submitted a similar comment and suggested that the second fade and recovery test and the fourth effectiveness test were redundant. That commenter suggested that those two tests be eliminated to simplify the test procedures of Standard 105.

The concern that the test requirements would result in braking systems biased toward the rear brakes was largely discussed in the preceding section of this notice. The proposed requirements of Standard 105 included both fully loaded and lightly loaded tests. The agency concluded, based upon its own vehicle tests and on information submitted by manufacturers, that the proposed test requirements could be met by changes in various braking system components. So long as both fully loaded and lightly loaded requirements were met, the braking system would be properly balanced for both fully loaded and lightly loaded conditions. By extending the fourth effectiveness requirements by 10 percent for vehicles with a

GVWR of 8,000 to 10,000 lbs., additional leeway was provided to manufacturers in designing their braking systems to be properly balanced. As noted above, no changes were made in the requirements applicable to vehicles with a GVWR of under 8,000 lbs., since recent models of most of those vehicles already pass the effectiveness requirements. Only minor changes are required for those vehicles that do not.

The two fade tests were designed to produce first a mild to moderate fade condition and then a more severe fade condition. Light fade occurs in vehicles even in low speed applications such as in heavy traffic. Moderate to severe fade is a condition that may occur when vehicles are used on hilly or mountainous roads, especially when heavy loads are carried. Far from being redundant, the second fade test simulates the type of fade experienced during long mountain descents. The agency has verified that the temperatures produced by the test sequence are the same temperatures as sometimes experienced during long mountain descents. The fade and recovery test requirements assure that brakes do not perform abnormally while subject to the heat caused by severe use or during the time that the brakes are cooling off after severe use.

The fourth effectiveness test is a complete effectiveness test that is conducted after most of the other tests, including the fade tests, have been completed. This test is included to give an overall system evaluation to assure that a braking system retains satisfactory characteristics related to effectiveness, pedal force, and sensitivity after exposure to the types of conditions simulated during the test sequence.

A comment submitted by the American Trucking Associations (ATA) suggested that the proposed fade requirements are severe enough to adversely affect user acceptance in normal service. According to ATA, compromises in such things as loss of feel and hard pedal in order to achieve greater fade resistance may be necessary. The comment also suggested that fade resistance tests developed in the past may be outdated as vehicles are becoming less powerful.

The agency tested a number of production vehicles before proposing the fade requirements and found that almost all of them met the requirements. The only vehicles tested by the agency which appeared to present problems were

some small imported pickup trucks. Since many other vehicles passed the requirements, without having problems such as loss of feel or hard pedal, it is clear that braking systems can be designed to meet the fade requirements without having the problems suggested by ATA. Since fade tests primarily apply to a vehicle's downhill performance, the requirements are appropriate for vehicles even if they are less powerful than in the past.

Partial System Failure; Failed Power-Assist/Power Units

Partial system failure requirements were included to ensure that a vehicle's brakes are capable of bringing the vehicle to a controlled stop in a reasonable distance if a part of the service brake system should fail. Stopping distance requirements were also proposed for vehicles with failed power-assist or brake power units.

The October 1979 notice explained that many manufacturers currently provide what are called split brake systems to provide braking capacity in the event of a partial failure. The split system consists of two or more brake subsystems, each of which is not affected by leakage or failure in the other subsystem. Split systems are typically used on passenger cars, school buses, light trucks and vans. Under the proposed requirements, all hydraulic braked vehicles are required to utilize a split or redundant brake system.

Several commenters stated that the stopping distances for partial failure and for inoperative brake power and power assist units for vehicles with a GVWR over 10,000 lbs. are too stringent. Daimler-Benz stated that the requirements could only be met if the operative braking system has an increased capacity.

In a late submission to the docket, Wagner Electric asserted that agency tests substantiating the capability to meet the partial system requirements for vehicles over 10,000 lbs. were based on the two most effective of the possible partial systems. The commenter stated that no data was provided on vertical split systems and suggested that the requirements as proposed would encourage forms of split systems, such as vertical split systems, that would inordinately increase the level of front brake torque (i.e., make the front brakes overly powerful) and contribute toward lock-up on icy or wet roads. (A vertical

split system essentially consists of one subsystem that supplies braking power to the front brakes and another subsystem that provides power to the back brakes. This contrasts with a variety of other types of split systems. Some horizontal split systems, for example, consist of two subsystems that each provide some braking power to each wheel. The two types of split systems which Wagner Electric's comment suggested are the most effective are a horizontal split and a 1- 1/2 x 1/2 split, a system with some of the attributes of a horizontal split system.) A comment submitted by ATA also suggested that the requirements would mandate overly powerful, aggressive front brakes.

Several commenters suggested that the stopping distance requirements for vehicles over 10,000 lbs. GVWR be relaxed. Wagner Electric suggested that the requirements currently in effect for school buses be adopted.

The partial system failure and failed power assist or brake power unit requirements were proposed by the agency after careful analysis of its own vehicle test results and of confidential data submitted by manufacturers. These data indicate that many production vehicles already meet the proposed requirements. The current school bus requirements were issued in 1975 under a short-term statutory deadline. Analysis of current school bus data indicates that many school buses already meet the more stringent requirements proposed by the October 1979 notice. As with other stopping distance requirements, there is some increment of safety benefit for each reduction of stopping distance. When partial failure of the service brake system occurs or brake power or power assist units become inoperative, it is important that a vehicle be able to stop in a reasonable distance, especially when that vehicle has the aggressivity associated with a GVWR of over 10,000 lbs.

In regard to Wagner Electric's comment concerning vertical split systems, it is true that if the subsystem providing power to the rear brakes in a vertical split system fails, the subsystem providing power to the front brakes would be required to meet the stopping distance requirements under the standard. Therefore, in order to meet this requirement with a vertical split system, a vehicle would need relatively powerful front brakes. Similar requirements

have been in effect for vehicles with air brakes under Standard 121, and European regulations necessitate even more powerful front axle brakes without safety problems.

Moreover, in keeping with the National Traffic and Motor Vehicle Safety Act, the requirements are written as performance requirements and not design requirements. Manufacturers may meet the requirements in many different ways and are not required to use vertical split systems. Indeed, the selection of a means of compliance that poses significant safety risks could raise a safety defect issue. If Wagner Electric is concerned that vertical split systems may contribute to lock-up when used on some vehicle configurations, the manufacturer has the option to use other types of split systems, such as horizontal splits, or a redundant split system. When one of the subsystems of a horizontal split system fails, some braking power is still provided to each wheel by the operative subsystem, so the stopping distances do not have to be met solely by the power provided to the front wheels. Therefore, the braking system does not have to have relatively powerful front brakes in order to meet the requirements. This would also be true for some other types of split systems and for redundant systems.

Wagner Electric also stated that the 150 lb. maximum pedal force specified for the requirements is too low and might result in overly sensitive brakes. That company suggested that a 200 lb. pedal force be adopted.

An analysis of the data referred to above indicates that many vehicles on the road already meet this requirement, without experiencing problems of oversensitivity. While Wagner Electric suggests in its comment that even a small person can reach a 200 lb. pedal effort, the agency has found that small females have difficulty even applying forces of less than 150 lbs.

Moreover, when a driver is used to applying very little force to bring a vehicle to a stop, the driver is likely to believe that the braking system has failed entirely, rather than only partially, if the driver applies maximum force and cannot feel the vehicle braking. Reports of "no brakes" are sometimes given in accident reports where only a partial failure has occurred. Therefore, it is important that a vehicle's braking system respond noticeably when a driver is applying significant force in a partial failure or

failed power assist or brake power unit situation.

A comment submitted by the Metropolitan Transit Agency of Dade County, Florida, called for lower pedal force requirements. That commenter cited the difficulty smaller drivers have in bringing a large bus to a stop after loss of vacuum. In establishing the 150 lb. pedal force, the agency took account of both the need to establish a level of pedal force appropriate for smaller drivers and to keep it high enough that brakes will not be oversensitive in ordinary use. That commenter also suggested that the agency establish requirements for vacuum reserve. The agency included optional procedures in Standard 105 that encourage manufacturers to include vacuum reserves by permitting slightly longer stopping distances in the no power tests if the vehicle has the capability of making several stops in consecutive order with gradually decreasing capabilities. The agency recognizes the safety advantages offered by vacuum reserves, but has not, as of yet, proposed that they be required.

A comment submitted by the Recreation Vehicle Industry Association (RVIA) requested that the test procedures for vehicles with a GVWR of over 10,000 lbs. be changed to require less stops and snubs to condition the brakes. The agency declines to make this change since a significant number of stops and snubs is required in order that a braking system's capability be tested in a "worn-in" condition.

Equipment Integrity

Comments on the requirements concerning equipment integrity were primarily limited to the spike stop requirements. RVIA suggested that the spike stop test requirements are inappropriate for motor homes. According to RVIA, it is unaware of a single case where a weakness that the spike stop test would uncover has ever been found in a motor home.

The spike stop test requirements were developed to determine the structural integrity of a vehicle's braking system. Vehicles must be capable of making several very sudden stops without loss of brake system structural integrity. Virtually all types of vehicles, including motor homes, are at times subjected to the abuse caused by very sudden stops. If the vehicle's braking system loses its structural integrity during such stops, serious accidents could result.

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Parking Brakes

The October 1979 notice proposed parking brake performance requirements designed to ensure that vehicles have adequate grade holding performance. Under the proposal, vehicles with a GVWR of 10,000 lbs. or less are to meet these requirements on a grade of 30 percent, when a maximum force of 90 lbs. is applied to hand-operated parking brake systems and 125 lbs. is applied to foot-operated parking brake systems. While no comments were received that were specifically opposed to the establishment of parking brake requirements for light trucks, several submissions did comment on the appropriateness of the 30 percent gradient and the maximum force requirements.

The Japan Automobile Manufacturers Association and Toyo Kogyo stated that a 30 percent gradient is too stringent. According to those comments, some vehicles have difficulty climbing a 30 percent grade when fully loaded. They requested that a gradient of 18 percent be adopted, stating that European and Australian safety standards incorporate that requirement.

The 30 percent gradient requirement, which is the same as that in effect for passenger cars and school buses with a GVWR of 10,000 lbs. or less, represents a degree of steepness that is found on roads in some parts of the United States. While the agency is unaware of any light trucks that cannot climb a 30 percent grade, even a vehicle that has difficulty climbing a 30 percent grade may on occasion be parked on such a steep hill. Moreover, recognizing the dangers inherent if a vehicle's grade holding performance is inadequate, the agency established the requirements with a view toward providing a margin of safety for parking brake systems. The safety margin will prevent accidents from occurring when vehicles are parked on more commonly found grades, in some instances, where parking brake systems have deteriorated over time or are improperly adjusted. It is also noted that although European regulations have only an 18 percent grade-holding requirement, those regulations also require a dynamic stopping performance test using the parking brake.

Several commenters stated that the maximum force requirements proposed by the standard for vehicles with a GVWR of 10,000 lbs. or less are

too stringent. Those commenters suggesting changes requested either that European requirements be followed (said to be 132 lbs. for hand-operated systems) or that current requirements for school buses be followed (125 lbs. for hand-operated systems and 150 lbs. for foot-operated systems).

The 90 lb. and 125 lb. requirements proposed by the notice are the same as those in effect for passenger cars. They were chosen by the agency as the maximum force requirements that are appropriate for small females. Since small females may be expected to drive light trucks, it is appropriate to require that parking brake systems be designed with their needs in mind. Moreover, the agency established the 90 lb. and 125 lb. requirements with a recognition that some parking brake systems are located in positions within the vehicle which are awkward for drivers to reach. The 90 lb. and 125 lb. requirements therefore provide a margin of safety for instances where drivers have difficulty applying adequate force to parking brake systems because of their location.

As with the other requirements of the proposal, the agency established the parking brake requirements after conducting tests on production vehicles. Neither the agency's test results or any comments submitted indicate that manufacturers will have difficulty meeting the parking brake requirements.

Costs and Benefits

The agency has considered the economic and other impacts of this final rule and determined that this rule is not significant within the meaning of Executive Order 12221 and the Department of Transportation's policies and procedures implementing that order. The agency's assessment of the benefits and economic consequences of this final rule are contained in a regulatory evaluation that has been placed in the docket for this rule-making. Copies of that regulatory evaluation can be obtained by writing NHTSA's docket section, at the address given in the beginning of this notice.

The October 1979 notice explained that a regulatory evaluation had been prepared before issuing the notice and had been included in the docket. A number of comments were received on the costs and benefits of the proposed requirements.

Ford stated that although its cost analyses were not complete, it had sufficient information to indicate that the proposed requirements would affect a greater number of Ford products and cost considerably more than the agency had estimated. Chrysler stated that the requirements would necessitate the redesign of the parking brake systems on all of its light trucks and require some degree of revision to master cylinders, brake boosters, and/or foundation brakes on 80 to 90 percent of its light trucks. That company also indicated that it would find it necessary to engage in considerably more testing than estimated by the agency in order to meet the proposed requirements.

Both Ford and Chrysler suggested that several requirements be relaxed in order to reduce the costs of the proposed standard. Ford requested that first, second and fourth effectiveness test stopping distances be relaxed for all vehicles and that third effectiveness test stopping distances be relaxed for vehicles with a GVWR of 8,000 to 10,000 lbs. Ford also requested that the stopping distance requirements for the failed system and spike stop check tests be relaxed and that the maximum parking brake force requirements be changed from 125 lbs. to 150 lbs. Chrysler asked that fourth effectiveness test stopping distances be extended by 16 percent and that the maximum parking brake force requirements be changed from 125 lbs. to 150 lbs.

General Motors stated that while it supported NHTSA action to require split service brake systems on vehicles over 10,000 lbs. GVWR, a considerably larger number of those vehicles would require changes than estimated by the agency. According to GM, optional split service brake systems were purchased on only two percent of its hydraulic braked heavy-duty vehicles in model year 1979.

In order to aid in developing its cost estimates, the agency enlisted an outside contractor before issuing the October 1979 notice to conduct an independent assessment of the costs that would be involved. A report prepared by the IIT Research Institute (IITRI), which was included in the docket, substantially verified the cost estimates made by NHTSA, with one exception.

As the regulatory evaluation explained, estimates on the light truck brake system costs differed, reflecting the different methodologies

used by IITRI and NHTSA. Since NHTSA's estimates were based on actual test results and confidential data submitted by the manufacturers, which were unavailable to IITRI, the regulatory evaluation used NHTSA figures for light truck brake system costs. IITRI figures were used for development/compliance test costs and cost estimates for medium and heavy duty trucks.

A revised regulatory evaluation, which has been placed in the docket, was prepared by the agency to accompany the issuance of this final rule. Revisions were made in the regulatory evaluation to reflect the latest information available to the agency.

The comments by Ford and Chrysler were difficult to evaluate since they gave only generalized bases for their assertions that a greater number of vehicles would be affected by the standard than estimated by the agency. While those commenters cited some additional braking system components that might require changes, they did not specify which vehicles would require the changes or indicate what the costs of those changes would be.

For example, while Chrysler asserted that the requirements would necessitate the redesign of the parking brake systems on all of its light trucks, it did not indicate its basis for believing that substantially more of its light trucks would require upgrading of their parking brake systems than estimated by the agency. Nor did it indicate what changes would be required or the costs of those changes. Ford stated that preliminary test results indicate that the proposal would necessitate for some models, in addition to those changes assumed by the agency to be required, the addition of hydraulic boosters or larger hydraulic boosters and revisions to brake pedals, power steering pumps, hoses and tires. Ford did not indicate the nature of the preliminary test data it was relying upon. Nor did that commenter specify what models would require additional changes or indicate the costs of those changes. Also, while Ford requested numerous changes in the proposed requirements, it did not attempt to support the specific changes it requested.

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For example, while Chrysler asserted that the requirements would necessitate the redesign of the parking brake systems on all of its light trucks, it did not indicate its basis for believing that substantially more of its light trucks would require upgrading of their parking brake systems than estimated by the agency. Nor did it indicate what changes would be required or the costs of those changes. Ford stated that preliminary test results indicate that the proposal would necessitate for some models, in addition to those changes assumed by the agency to be required, the addition of hydraulic boosters or larger hydraulic boosters and revisions to brake pedals, power steering pumps, hoses and tires. Ford did not indicate the nature of the preliminary test data it was relying upon. Nor did that commenter specify what models would require additional changes or indicate the costs of those changes. Also, while Ford requested numerous changes in the proposed requirements, it did not attempt to support the specific changes it requested.

In light of the agency's own detailed evaluation of the changes made necessary by the requirements and of the costs of those changes, which was based upon test data and manufac-

turer-supplied information, as well as the independent assessment made by IITRI, the agency continues to believe that its cost estimates are correct, with one exception noted below.

The agency did change the regulatory evaluation's estimate of the number of vehicles with a GVWR over 10,000 lbs. requiring split brake systems. The agency had anticipated that a greater percentage of those vehicles would be purchased with optional split brake systems. While the number of vehicles affected by that requirement is greater than originally estimated by the agency, the cost per vehicle remains the same, and the agency believes the requirements to be fully justified by the benefits that will accrue.

Other comments that were received concerning costs related to costs of developing anti-lock or similar devices, such as brake system pressure modifiers, and cost that would be borne by final stage manufacturers. As explained fully above in the portion of this notice entitled "Effectiveness Requirements," manufacturers will not find it necessary to develop anti-lock or similar devices, nor will final stage manufacturers in most cases have any costs as a result of the standard. Instead, final stage manufacturers will ordinarily be able to rely on the incomplete vehicle manufacturer's certification of the braking system.

The October 1979 notice explained that the proposal was a continuation of prior NHTSA rulemaking on Standard 105. While the extension of Standard 105 to trucks, buses and MPV's had proceeded to the adoption of a final rule, that extension was indefinitely delayed in April 1975 because the agency had determined that although the benefits of the rule would be substantial, the costs of the standard, particularly for heavy trucks, warranted delaying the standard. See 40 FR 18411, April 28, 1975.

Manufacturers have made a number of significant improvements in their braking systems since that time on a voluntary basis, largely following the requirements and test procedures of the delayed final rule. Because of those improvements, as well as some changes made in the requirements by the agency, the costs of the standard today are only a small fraction of what they would have been in 1975.

The April 1975 notice stated that manufac-

turers had submitted costs for light to medium duty trucks that ranged from \$54 to \$775 per unit (depending on model configuration) to attain compliance with the standard. The agency compared those figures with independently gathered detailed cost information and substantiated that the manufacturers' estimates were accurate. In contrast to those figures, the agency today estimates that the average cost per domestic light truck, bus, or MPV with a GVWR of 10,000 lbs. or less is only \$2.71, or about \$21.24 for each vehicle that needs to be upgraded in braking system performance. The costs for meeting the partial failure and warning indicator requirements for medium and heavy trucks (over 10,000 lbs. GVWR) are estimated to be about \$54 per vehicle. The total costs of meeting the standard's requirements for all trucks, buses and MPV's are estimated to be under \$18 million.

As explained elsewhere in this notice, the regulatory evaluation, and the October 1979 notice, the agency carefully evaluated the costs and benefits of the proposed requirements. In analyzing costs, the agency estimated how the requirements would affect each manufacturer on a model-by-model basis. In light of this detailed analysis and evaluation, the agency declined to relax particular requirements on the sole ground that they would result in some costs to manufacturers.

A number of comments were also received that related to the benefits of the standard. Ford stated that the proposed requirements have not been justified as being the minimum necessary to provide safe operation of the affected vehicles. That commenter stated that the agency had not provided evidence that the levels of braking performance of today's vehicles are causative factors in the accidents involving those vehicles.

Ford also stated that the estimate of benefits presented in the agency's regulatory evaluation is based on inappropriate data and incomplete analysis. In particular, that commenter stated that a study by the Institute for Research in Public Safety (IRPS) that was cited by the regulatory evaluation does not support the conclusion that a 5 to 10 percent reduction in accidents could be obtained by a 5 percent shortening of stopping distances. That study was based on a sample of skidding accidents, and the finding was related to the benefits that would accrue if

vehicles were equipped with anti-lock braking systems. According to Ford, that finding does not relate to the effect on accidents that would be attributable to the implementation of the proposed requirements, since the requirements do not anticipate the introduction of anti-lock braking systems. That company also asserted that the relationship between measured vehicle parameters such as specific stopping distances derived under specified test conditions and the safety effectiveness of the same vehicle in customer service has yet to be established.

A similar comment was submitted by NTEA. That commenter stated that by failing to demonstrate why an increase in light truck accident fatalities has occurred or that the proposed standard will in any way reduce those fatalities, the NHTSA data are seriously deficient. NTEA also stated that since the requirements will affect only 17 percent of the vehicles subject to the standard, NHTSA is obligated to identify that 17 percent segment as the cause of the safety problem. (As a result of the agency revising its estimate of the number of vehicles with a GVWR over 10,000 lbs. requiring the addition of split service brake systems, discussed above, the percentage of vehicles requiring changes as a result of the standard is now estimated to be about 20 percent.)

The October 1979 notice explained that in carrying out the mandate of the National Traffic and Motor Vehicle Safety Act to issue vehicle safety standards to protect the public against unreasonable risk of vehicle accidents and of death or injury occurring as a result of such accidents, the agency is confronted with inherent problems that limit the degree of certainty and precision achievable in estimating the effectiveness and therefore benefits of proposed standards. While engineering and accident analyses can clearly demonstrate that certain vehicle improvements will facilitate the performance of the driver's task and thereby improve safety, it is virtually impossible to isolate individual factors to arrive at precise and certain conclusions about the quantified benefits that will accrue.

Given the duty to act in the area of accident avoidance notwithstanding an inherent measure of imprecision and uncertainty, the agency has developed and issued accident avoidance standards while attempting within its capabilities to

quantify the benefits of the standards and limit the uncertainty. The extension of Standard 105 is no different, and, given the inevitable residual uncertainty, the decisionmaking regarding the precise requirements rests in part on policy judgment.

The braking system of a vehicle clearly provides its most important accident avoidance capability. Common sense, as well as basic traffic theory, indicate that a vehicle with a shorter stopping distance capability will be safer than the same vehicle with a longer stopping distance capability, assuming that other parameters such as vehicle stability are held constant. Also, as noted above, since light trucks, buses, and MPV's share the same traffic flow as passenger cars, they should ideally have the same stopping distance capability.

As fully explained above, the agency carefully evaluated the costs of improving braking systems for light trucks, buses and MPV's and proposed requirements that, in its judgment, were economical. In recognition of the costs and problems associated with anti-lock or similar devices, the agency proposed requirements that could be met, where upgrading was required, by simple, state-of-the-art changes to the types of braking systems in use. Since braking ability is an extremely important safety factor and stopping distances can economically be made significantly shorter for light trucks, buses, and MPV's, the agency believes that the braking ability of those vehicles creates an unnecessary risk.

Because available accident data and studies are limited, it is very difficult to make estimates as to the precise benefits that will result from improving a vehicle's accident avoidance capability. The best information available to the agency in estimating the benefits resulting from improved stopping distances was the IRPS study, which was based on a survey of skidding accidents. Skidding accidents are useful for analysis because they leave physical evidence indicating the braking distance of a vehicle prior to impact. Based upon that study, the agency concluded that a 5 to 10 percent reduction of accidents could be obtained by a 5 percent shortening of stopping distances.

The proposed requirements would result in a reduction of skidding accidents, despite the fact that anti-lock or similar devices are not con-

templated, since some vehicles would have their braking balance improved. Also, with better braking capability, drivers might be less prone to applying their brakes in a manner that would result in skids. While the IRPS data may not be ideal, since it looked at some types of skidding accidents that would not be prevented by the requirements and did not look at some accidents that would be prevented (i.e., those that do not leave skid marks), the agency believes that it does provide evidence that is useful in analyzing all accidents where braking is attempted.

The 105 test sequence was designed to simulate real world conditions. A vehicle's braking system is tested, for example, in new and broken-in conditions, at various speeds, while the vehicle is fully and lightly loaded, under varying conditions of fade, and under partial failure and failed power. Thus, the test does relate to performance in customer service.

In deciding to propose the extension of Standard 105 to light trucks, buses and MPV's, the agency was very concerned about the recent increase in light truck fatalities. However, the extension is directed at all accidents and not merely at the increase in accidents as suggested by NTEA.

As noted above, manufacturers have largely improved the braking performance of many of the vehicles subject to this standard since the final rule was delayed in 1975. Because of these improvements, changes will be required in only about 20 percent of the vehicles subject to the standard. The only effect on the other 80 percent of vehicles is that manufacturers will not be able to reduce the performance of those vehicles' existing braking systems.

The agency believes it appropriate to require that manufacturers maintain the current level of braking performance for that 80 percent segment of vehicles. In the 1960's, for example, stopping distances of passenger cars lengthened as a result of increased weight. Today, the agency is concerned that manufacturers might reduce the braking ability of their vehicles as part of an effort to improve fuel economy. Since some braking system components are relatively heavy, the braking system is a prime target for weight reduction. The agency believes braking ability to be such an important safety factor that it should not be compromised by efforts to improve fuel economy.

Because of the limitations of available accident data, it is difficult and sometimes impossible to use available accident data to determine the accident rates of particular vehicle types. As noted above, the agency believes the braking ability of those vehicles requiring upgrading of their braking systems to create an unreasonable risk, since that ability can economically be significantly improved.

Miscellaneous Comments

The Japan Automobile Manufacturers Association stated that separate requirements should be applicable to vehicles used for passengers and those used for cargo. That request is similar to ones received during other rulemaking proceedings to establish separate requirements for commercial applications.

The National Traffic and Motor Vehicle Safety Act contemplates the application of standards based on vehicle type instead of vehicle use. Basing a standard on vehicle use would present difficult enforcement problems. It would also place a manufacturer in the difficult position of having to assess in advance the potential future use of the vehicle. Further, basing standards on vehicle use does not recognize that a vehicle may have two or more uses during its lifetime. Therefore, the agency has declined to establish separate requirements based upon vehicle use.

The Japan Automobile Manufacturers Association also requested that all vehicles with a GVWR over 10,000 lbs., other than school buses, be included in Standard 130 under contemplation. Daimler-Benz also requested that vehicles over 10,000 lbs. be included in one standard, whether they have air brakes or hydraulic brakes. Based upon the differences between air brake systems and hydraulic brake systems, the agency has issued separate standards for the two types of braking systems. Standard 121 currently applies to air braked vehicles and Standard 105 to hydraulic braked vehicles.

The agency has issued an advance notice of proposed rulemaking for a new standard to apply to heavy duty brake systems, Standard 130, which addressed issues for which rulemaking is at least several years away. See 45 FR 13155, February 28, 1980. A notice of proposed rulemaking, with opportunity to comment, would be issued if the agency decides to proceed with that standard.

General Motors stated that the proposed requirements of Standard 105 may not be appropriate for electric vehicles which are under development. Since these vehicles are still in the development stage, the agency is unable to establish at this time what types of changes, if any, would be appropriate for electric vehicles. The agency will consider the need for different requirements for electric vehicles when more information is available as to what characteristics those vehicles will have.

Wagner Electric requested that the weight permitted for driver and instrumentation on vehicles with a GVWR of 10,000 lbs. or less for the lightly loaded tests be increased from 300 lbs. to 400 lbs. to permit the use of more recording equipment. Since the lightly loaded tests measure the braking ability of a vehicle while unloaded, it is desirable to keep the weight as low as possible. However, after evaluating the types of instrumentation that are used to certify compliance with Standard 105, the agency agrees that increasing the weight allowance for driver and instrumentation from 300 lbs. to 400 lbs. for vehicles with a GVWR of 10,000 lbs. or less will allow the use of additional types of instrumentation that will be useful in evaluating the performance of a vehicle's braking system. Moreover, the agency has determined that the slight increase in weight will not adversely affect the results of the lightly loaded tests.

One commenter suggested that the standard's requirements might have an adverse effect on tire manufacturers, since tires are an important parameter in complying with the standard and manufacturers would not have the time, funds or facilities to test every kind of tire. Manufacturers will not be required to test all kinds of tires, since they purchase tires according to specifications. Normal production tires were used in all tests relied on by the agency in establishing the standard's requirements. The standard has been in ef-

fect for several years for passenger cars and school buses without adverse effects on tire manufacturers.

Leadtime

Numerous comments were received on the proposed effective date of the requirements. The agency evaluated those comments and agrees with a number of them that a minimum of 2 years leadtime is appropriate. The effective date of the standard was changed to September 1, 1983, which gives a leadtime well in excess of 2 years and corresponds with the start of a new model year.

Chrysler stated that it required a leadtime of 30 months if its recommendations were adopted and 42 months if its recommendations were not adopted. The extra 12 months beyond 30 months were said to be needed to develop load-sensing or deceleration-sensing proportioning valves. As explained fully in this notice, no manufacturer will be required to develop anti-lock or similar devices in order to be able to comply with the standard's requirements. The effective date of this final rule gives a leadtime of approximately 30 months.

The principal authors of this notice are George L. Parker, Office of Vehicle Safety Standards, and J. Edward Glancy, Office of Chief Counsel.

In consideration of the foregoing, §571.105, Chapter V of Title 49, Code of Federal Regulations, is amended accordingly.

Issued on December 22, 1980.

Joan Claybrook
Administrator

46 FR 55
January 2, 1981

PREAMBLE TO AN AMENDMENT TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 105

Hydraulic Brake Systems

(Docket No. 70-27; Notice 23)

ACTION: Final rule; response to petitions for reconsideration.

SUMMARY: This notice responds to three petitions for reconsideration concerning the amendment extending Standard No. 105, *Hydraulic Brake Systems*, to trucks, buses, and multipurpose passenger vehicles (MPV's). The amendment also upgraded the standard's requirements for school buses. In response to one of the petitions, the agency has changed the parking brake gradient requirement from 30 percent to 20 percent for trucks, buses (other than school buses) and MPV's with a GVWR of 10,000 pounds or less. The agency will shortly propose a conforming amendment to make the same change for school buses with a GVWR of 10,000 pounds or less.

DATES: This amendment is effective September 1, 1983. That is the same effective date as for the January 1981 final rule extending Standard No. 105 to trucks, buses and MPV's.

ADDRESS: Petitions for reconsideration should refer to the docket number and be submitted to: Docket Section, Room 5109, 400 Seventh Street, S.W., Washington, D.C. 20590.

SUPPLEMENTARY INFORMATION: On January 2, 1981, the NHTSA published in the *Federal Register* (46 F.R. 55) a final rule amending Standard No. 105, *Hydraulic Brake Systems*. Prior to that time, the standard

applied to passenger cars and school buses only. The amendment extended the standard's applicability on a general basis (with some modifications) to trucks, all types of buses, and multipurpose passenger vehicles (MPV's) with a gross vehicle weight rating (GVWR) of 10,000 pounds or less. (These vehicles are collectively referred to as LTM's.) Several requirements were also extended to trucks, buses and MPV's with a GVWR greater than 10,000 pounds. In addition, the standard's requirements for school buses were upgraded.

Petitions for reconsideration were filed with the agency by Chrysler, Ford and the Brake System Parts Manufacturers Council, all of which dealt almost entirely with the requirements applicable to vehicles with a GVWR of 10,000 pounds or less. Of the three petitions, Chrysler's was the only one that raised any technical issues associated with compliance with the amendment. All three petitions challenged the amendment on the bases of safety need and/or costs and benefits. After carefully evaluating those petitions, the agency decided to modify the parking brake requirements in response to Chrysler's petition. To the extent set forth below, Chrysler's petition is granted. Otherwise, Chrysler's petition and the other two petitions are denied.

Parking Brake Requirements

Standard No. 105 includes requirements for both a vehicle's service brake system and its parking brake. These two systems are related in that the parking brake uses major

components of the service brake system, including the brake shoes and brake drums. The final rule's parking brake requirements specified that various performance tests be met when a vehicle is parked on a 30 percent grade and a maximum force of 90 pounds is applied to hand-operated parking brake systems and 125 pounds is applied to foot-operated parking brake systems.

Chrysler's petition for reconsideration stated that the parking brake effort limits would cause a major redesign of most of its brake systems. According to that company, such redesign would waste scarce resources and be inflationary in the absence of demonstrated benefits.

The agency contacted Chrysler to obtain clarification of that company's assertions. The agency requested information about the nature of the changes needed to meet the parking brake requirements and the costs of those changes, as well as data substantiating those needs. Chrysler indicated that all of its parking brake systems would require changes in order to meet the parking brake requirements. Many vehicles were said to require a major redesign, including new actuating pedals and supporting structures, low friction cables with new guides, new parking brake lever arms within the rear brake drums, and new shoes and linings.

Chrysler's assertions were substantiated by test data. Chrysler ran a series of parking brake tests on a cross-section of its light trucks on both a 32 percent grade and a 20 percent grade. (The 32 percent grade was used because it was the grade closest to 30 percent that Chrysler had available.) Of nine vehicles tested on the 32 percent grade, only one passed the parking brake tests. That vehicle passed by a margin generally considered to be insufficient to assure that other vehicles of the same type would pass the tests.

In addition to the information received from Chrysler, the agency received new data from agency-sponsored tests that were conducted for purposes unrelated to this rulemaking. Three Chrysler LTM's were among the vehicles tested. While the tests were limited in number, their results

confirmed the information supplied by Chrysler. Both the data submitted by Chrysler and the test results received from the agency-sponsored tests have been placed in the docket.

The agency evaluated Chrysler's assertions in light of the test data received. Based upon that data, the agency has concluded that its Regulatory Evaluation underestimated the costs of the parking brake requirements for Chrysler. Because this conclusion is based on actual test results, it is more reliable than the original conclusions made in the Regulatory Evaluation. Those earlier conclusions were largely based on engineering analysis, which is generally less reliable than actual testing. While they were also based on confidential information received from manufacturers, the agency had received less information from Chrysler than from other companies.

The Regulatory Evaluation estimated that 10 percent of Chrysler's LTM's would require changes in order to meet the parking brake requirements, at an average cost of \$10.00 per vehicle needing changes. The agency now estimates that virtually all of Chrysler's LTM's would require changes in order to meet the parking brake requirements as issued. Many of Chrysler's LTM's would require a minor redesign with the types of changes indicated by Chrysler and listed above. Other vehicles would require a minor redesign, with such changes as longer actuating pedals, rerouted cables, and new parking brake lever arms within the rear brake drums.

Chrysler did not provide information about the costs of the changes needed to meet the parking brake requirements. The agency estimates that the cost per vehicle requiring a major redesign would be \$17.50, while the cost per vehicle requiring a minor redesign would be \$6.00. These estimates are based on the types of changes needed for a major redesign and a minor redesign, discussed above. The agency used brake system component costs contained in a report prepared by the IIT Research Institute under contract to the agency, for guidance in preparing its estimates. That report, which was issued in 1979, was included in the docket

at the time the notice of proposed rulemaking was issued.

In response to Chrysler's petition for reconsideration, the agency reevaluated Standard No. 105's parking brake requirements in light of the higher costs that it recognizes would result from those requirements. In reevaluating the requirements the agency analyzed two issues: the appropriateness of the parking brake effort limits and the 30 percent gradient. Concerns about both of these issues were raised by several commenters in response to the notice of proposed rulemaking.

While the parking brake effort limit and gradient requirements address different issues from the point of view of motor vehicle safety, in practice the two requirements are closely related. Over a certain range of both force and gradient, a given parking brake will hold a vehicle on increasingly steep gradients as increasingly greater force is applied to the brake. Thus, a given parking brake design may be able to meet either a more stringent parking brake effort limit (i.e., a limit requiring that less force be used) or a steeper gradient, but not both.

The agency has concluded, in light of the lack of significant safety need for a gradient requirement as stringent as 30 degrees and the increased costs that would result from the parking brake requirements, that the parking brake gradient requirement should be changed from 30 percent down to 20 percent with retention of the parking brake effort limits. As explained below, this change will substantially reduce the costs of the parking brake requirements with only a minimal impact on benefits. Also, the change may promote international harmonization of safety standards. Consideration is currently being given in Europe to changing its standard to incorporate a 20 percent gradient requirement instead of an 18 percent gradient.

The preamble to the final rule explained that two commenters had indicated that they believed the 30 percent gradient to be too stringent. Those commenters requested that an 18 percent gradient be adopted, noting that European and Australian safety

standards incorporate that gradient. The agency declined to adopt a less stringent gradient at that time, noting that 30 percent gradients do exist in some parts of the United States and that the requirement provided a margin of safety where parking brake systems have deteriorated over time or are improperly adjusted. Even at that time, the agency recognized that any benefits of that particular requirement would be relatively small. Roads with a gradient as steep as 30 percent exist in only a few parts of the country. Therefore, only a small number of vehicles affected by this standard would ever encounter such roads.

The agency does not believe that the large numbers of vehicles affected by the standard should be required to meet this particular requirement which would only be of any possible benefit for a very small number of vehicles.

The agency declined to change the parking brake effort requirements because they were chosen as the maximum force requirements that are appropriate for small females. Those requirements, a maximum force of 90 pounds for hand-operated parking brake systems and 125 pounds for foot-operated parking brake systems, are the same as those in effect for passenger cars. Chrysler's comment on the notice of proposed rulemaking had asked that they be changed to 125 pounds and 150 pounds, respectively. Those limits represent the parking brake effort requirements that have been in effect for school buses for several years. Research studies indicate, however, that between 20 and 50 percent of the female driving population do not have enough strength to exert the maximum pedal efforts that have been permitted for school buses. It is appropriate to require that parking brake systems be designed with the needs of the driving population in mind. The 90 pound and 125 pound limits will cut the above percentages in half, i.e., only 10 percent to 25 percent of the females may lack sufficient strength.

The new parking brake effort limits apply to all LTM's, including school buses (with a GVWR of 10,000 pounds or less). As noted above, school buses were subject to Standard

No. 105 before the January 1981 final rule was issued. The parking brake requirements for school buses with a GVWR over 10,000 pounds, which specify both a 20 percent gradient and the less stringent effort limit, were not changed by either the January 1981 final rule or this amendment. However, the January 1981 final rule did change the standard's parking brake requirements for school buses with a GVWR of 10,000 pounds or less to include the new more stringent effort limit. The agency had not proposed changing the gradient requirement, which remained at 30 percent.

As a conforming amendment, the agency will shortly propose to change the gradient requirement for school buses with a GVWR of 10,000 pounds or less from 30 percent to 20 percent. The purpose of that change would be to make the parking brake requirements for those school buses the same as for other LTM's. The agency believes that change should be made primarily because school buses are constructed on the same chassis, including parking brakes, as other LTM's. Different parking brake requirements for school buses could either limit which chassis could be used for school buses or require that new parking brake systems be specifically designed and installed on some of those chassis used for school buses. In light of the more stringent parking brake effort limits and the relationship between force and the steepness of gradient on which a parking brake will hold a vehicle, the agency does not believe that current school bus parking brakes will be significantly altered as a result of the less stringent gradient requirement.

The agency has determined that significant cost savings will result from changing the gradient requirement for all LTM's. With a 30 percent gradient requirement, Chrysler would be required to complete major redesigns of the braking systems of many of its vehicles and minor redesigns of the rest. With the 20 percent gradient requirement, Chrysler will not have to complete any major redesigns. The agency estimates that Chrysler will have to complete minor redesigns on approximately 48 percent of its vehicles.

A Supplement to the Final Regulatory Evaluation has been prepared to reflect these new conclusions and has been placed in the docket. The figures contained in that document assume that the conforming amendment for school buses, discussed above, will be made. If it is not made, substantially higher costs for school buses could be involved. Because of the larger number of vehicles that are now estimated to be affected, the new projected cost for parking brake requirements for Chrysler is higher than previously estimated, despite the relaxation of the gradient requirement. The Supplement to the Final Regulatory Evaluation estimates that the parking brake requirements will result in a total cost to Chrysler of \$1,271,400. The previous estimate was \$442,000. The agency now estimates that the total costs of the parking brake requirements for Chrysler would have been in excess of \$3,000,000 if the gradient requirement was left at 30 percent.

While the agency now estimates that the 20 percent grade will result in greater costs for Chrysler (though not for manufacturers as a whole) than originally estimated, the agency believes that those costs are justified. The parking brake of a vehicle performs an important safety function. It is vital that a vehicle's parking brake be able to hold the vehicle on the types of grades on which it is parked. Twenty percent grades are not uncommon in urban and residential areas, both on streets and driveways, where these vehicles are likely to be parked. In light of the relatively modest cost required to meet the 20 percent grade requirement, the agency has determined that vehicles not meeting that requirement pose an unreasonable safety risk. As noted above, Standard No. 105 has required even large school buses, i.e., those with a GVWR greater than 10,000 pounds, to be tested on a 20 percent grade for several years. Also, Standard No. 121, *Air Brake Systems*, uses a 20 percent grade for large air-braked trucks.

The change in gradient will result in cost savings to other manufacturers. The agency's new cost estimates for those manufacturers are set forth in the Supplement to the Final

Regulatory Evaluation. The agency estimates that while the number of vehicles requiring upgrading as a result of the parking brake requirements will not change for those manufacturers, less significant design changes will be needed to meet the new gradient requirement. The costs for those manufacturers will therefore be less than previously estimated.

Service Brake Requirements: Technical Issues

Chrysler's petition discussed several issues in addition to the parking brake requirements and requested withdrawal of the entire amendment pending further studies. That company stated, as it did in its comment on the notice of proposed rulemaking, that the test requirements are overly stringent and unreasonable because the test procedures are abusive to the brake system. According to that commenter, the test procedure is unrepresentative of real-world driving conditions and goes beyond the need for motor vehicle safety. Moreover, that commenter suggested that the requirements might cause manufacturers to bias the design of brake systems toward complying with the standard rather than providing brake systems that are balanced under all vehicle loading and driving conditions.

The agency carefully considered and addressed those concerns in the preamble to the January 1981 final rule. Chrysler's petition neither addressed the statements made by the agency in response to those concerns nor indicated any consideration of changes made in the standard's requirements to assure that manufacturers have adequate leeway to produce well-balanced brake systems. The petition also did not cite any new issues or data related to those concerns. Moreover, as explained in the preamble to the final rule, the vast majority of light trucks sold today already meet all of the standard's performance requirements without experiencing any problems relating to the balancing of brake performance.

Standard No. 105's test procedures were developed by the agency to assure that a vehicle's braking system meets minimum

performance requirements under the varying types of conditions experienced in actual service. A vehicle's braking system is tested, for example, in new and broken-in conditions, at various speeds, while the vehicle is fully and lightly loaded, under varying conditions of fade, and under partial failure and failed power.

Contrary to the assertions made by Chrysler's petition and as explained in the preamble to the final rule, the tests do represent the types of conditions experienced in actual service. For example, the standard's second fade test, which Chrysler has alleged in the past to be abusive, simulates the type of fade experienced during long mountain descents. The agency has verified that the temperatures produced by the test sequence are the same temperatures as sometimes experienced during long mountain descents.

Chrysler's comment on the proposed rule requested only one change in the standard's requirements based upon the above-stated concerns, an increase of 16 percent in fourth effectiveness (fully loaded) stopping distances. Chrysler stated that change was necessary to provide consumers with better balanced brake systems and to avoid the use of unproven load or deceleration sensing proportioning devices. As the preamble to the final rule explained, the proposed stopping distances were based on vehicle tests conducted by the agency using production vehicles with unaltered brakes and on confidential information provided by General Motors, Ford and Chrysler. These data indicated that recent models of almost all vehicles under 8,000 pounds GVWR passed the proposed requirements. Moreover, the agency determined that all vehicles subject to the standard could meet the proposed requirements without using unproven load or deceleration sensing proportioning devices by instead making modifications to such vehicle components as brake linings, wheel cylinders, master cylinders, and combination valves.

A vehicle's braking system which met the proposed requirements for Standard No. 105 would be adequately balanced in that it would

meet performance requirements under the varying conditions described above, most significantly when the vehicle was both loaded and unloaded. Based upon a number of comments received from manufacturers, however, as well as on a further evaluation of available data, the agency determined for the January 1981 final rule that the stopping distances for the fourth effectiveness test for vehicles with a GVWR of 8,000 to 10,000 pounds should be extended by 10 percent. This change gave manufacturers additional leeway in balancing their braking systems, thus making it easier to design systems that are balanced for both fully loaded and lightly loaded conditions.

The preamble to the final rule explained that since the agency had concluded that the requirements could be met as proposed for all vehicles (for both loaded and unloaded tests) without anti-lock or similar devices, the agency declined to adopt Chrysler's suggestion of a 16 percent extension of fourth effectiveness stopping distances. Instead, NHTSA chose the 10 percent extension suggested by a number of other manufacturers. The agency further determined, based on test data, that a 10 percent extension would be sufficient to make it easier for manufacturers to assure that their vehicle's braking systems perform well in both loaded and unloaded conditions.

Neither Chrysler's comment on the notice of proposed rulemaking or its petition for reconsideration explained the derivation of its 16 percent figure. Moreover, Chrysler's petition for reconsideration did not indicate why the 10 percent extension was insufficient to meet the problem identified by Chrysler and did not either renew that company's request for a 16 percent extension, or raise any other issues concerning the matter.

Safety Need, Costs and Benefits

All three petitions for reconsideration challenged the extension of the standard on the bases of safety need and/or costs and benefits. Chrysler stated that the January 1981 final rule would require it and probably other manufacturers to redesign service and

parking brake systems of light duty trucks, buses and MPV's. According to that commenter, such changes would waste scarce resources in the absence of any demonstrated safety need. As explained above, the agency changed the parking brake requirements in response to Chrysler's concerns. Ford's petition requested withdrawal of the entire final rule because it believes there has been a complete lack of any valid demonstration by NHTSA that the implementation of the requirements may reasonably be expected to produce the safety benefits that have been projected for it and because it believes that the expenditures required to demonstrate conformity with the standard are excessive and inflationary. Ford's petition also stated that NHTSA has failed, based on data presented, to establish a safety need for the extension of the standard. The Brake System Parts Manufacturers Council stated in its petition that it did not believe that careful analysis has been conducted relating to the costs and benefits of the standard and that it does not believe that regulations should be adopted unless the benefits exceed the costs of the regulation.

The issues of safety need and costs and benefits were discussed at considerable length in the preambles of the notice of proposed rulemaking and the final rule and in the Regulatory Evaluation which was prepared by the agency and made available to the public. As those documents indicate, the agency did carefully consider those issues.

The safety need for the extension of the standard arises from the vital safety role played by a vehicle's braking system and the fact that many vehicles are produced with braking systems which can be significantly improved at an economical cost. In evaluating safety need, the agency carefully considered studies indicating the number and seriousness of accidents involving these vehicles, the overinvolvement of LTM's in fatal accidents as compared with passenger cars, the reduction in accidents that would result from improved braking systems, and the costs and feasibility of making such improvements.

One of the agency's primary concerns about LTM braking is the differential in stopping distances between passenger cars and LTM's. Since light trucks, buses and MPV's share the same roads and traffic flow with passenger cars, they should ideally stop in the same distances. The preamble to the final rule explained, however, that there are differences between passenger cars and LTM's which make accomplishing that goal more difficult for LTM's. Therefore, taking those differences into account, the agency established stopping distances for light trucks, buses and MPV's which are slightly longer than those in effect for passenger cars. In light of the greater aggressiveness associated with LTM's as a result of their size, weight, and design, the agency determined that there is a safety need for LTM braking to be as optimal as is economically feasible, thereby reducing the differential in stopping distances between passenger cars and LTM's and reducing accidents involving those vehicles.

Based on those considerations, the agency believes there is a safety need to assure that the braking performance of all vehicles subject to the standard is at the optimal level which can economically be achieved. Approximately 25 percent of the vehicles subject to the amendment will require improved braking systems. Moreover, the rulemaking action has had and will continue to have an effect on the other 75 percent of vehicles. As is explained below, manufacturers have already improved the braking systems of many of their vehicles, largely as a result of this rulemaking.

The agency believes there is a safety need to assure that those vehicles' braking performance is not downgraded. Increases in stopping distance are not without precedent. Stopping distances for passenger cars actually lengthened during the 1960's as a result of increased weight. Today, the agency is concerned that manufacturers might be tempted, in the absence of a standard, to reduce the braking performance of their vehicles as part of an effort to reduce weight and thereby improve fuel economy. Since some braking system components are

relatively heavy, the braking system is a prime target for weight-reduction. The agency believes braking ability to be such an important safety factor that it should not be compromised by efforts to improve fuel economy.

Contrary to assumptions made by Ford's petition for reconsideration, the agency did not issue the amendment to Standard No. 105 solely because of the overinvolvement of LTM's in fatal accidents, as compared to passenger cars, and the rise in the trend of those accidents. Ford attempted to demonstrate in its petition that the overinvolvement of LTM's in fatal accidents is the result of a greater number of young males driving those vehicles rather than a problem with LTM braking ability. Ford also argued that there is no evidence that improved braking ability for LTM's will reverse the rise in the trend of fatal accidents involving those vehicles.

The agency included in its Regulatory Evaluation an analysis of accident data involving LTM's. The agency stated that the overinvolvement of LTM's in fatal accidents suggests a probability that LTM's are deficient in accident preventative systems and/or that their weight and aggressiveness make them dangerous to pedestrians, bicyclists, and occupants of lower weight cars. The Regulatory Evaluation noted that in either case improvement of the braking systems of LTM's for greater accident prevention would serve to help fulfill the need for safety.

Ford may be correct that the demographic profile of LTM drivers is another factor accounting for the overinvolvement of LTM's in fatal accidents. That would not change the fact that improved braking ability will reduce accidents. Similarly, the fact that the rise in the trend of fatal accidents involving LTM's has occurred during a period when braking performance has either improved or been held constant does not alter the fact that further improvements in braking performance will produce additional safety benefits. There is a safety need for vehicles' braking systems to perform as optimally as is economically feasible. The agency has not

claimed that improved braking performance will by itself reverse the rise in the trend of fatal accidents involving LTM's. The agency has determined that improved braking performance as a result of the amendment will reduce accidents that would occur in the absence of the standard and thereby save lives.

The amendment to Standard No. 105 was issued by the agency in light of the total number of accidents involving LTM's and not just the increase in those accidents. As noted above, the agency evaluated the number and seriousness of accidents involving LTM's, the overinvolvement of LTM's in fatal accidents as compared with passenger cars, the reduction in accidents that would result from improved braking systems, and the costs and feasibility of making such improvements. Before issuing the notice of proposed rulemaking, the agency estimated both the costs and the benefits of the requirements and concluded that the costs of the amendment were justified by the benefits. Based upon all of these factors, the agency concluded that improving braking systems is a reasonable way of reducing some of the LTM accident problem.

The rulemaking process for this amendment has been going on for a period of over 10 years. During the early 1970's, a final rule was issued establishing braking requirements for these vehicles. However, that rule was indefinitely delayed in 1975 based upon economic considerations. Since that time, manufacturers have voluntarily made a number of improvements in their braking systems, largely following the requirements and test procedures of the delayed final rule.

Because of the voluntary changes made by manufacturers in many of their vehicles since the previous final rule was delayed, as well as changes made by the agency in the new standard, the costs of the amendment are estimated to be only a small fraction of those of the delayed 1975 final rule. Manufacturers had submitted costs for the 1975 final rule for light to medium duty trucks that ranged from \$54 to \$775 per unit (depending on model configuration) to attain compliance with the

standard. The agency compared those figures with independently gathered detailed cost information and determined that those estimates were accurate.

Those figures have no relevance to the January 1981 final rule. Today, as a result of the voluntary changes made by manufacturers in many of their vehicles and changes made in the standard's requirements by the agency, it is estimated that the average cost of the new final rule will be only \$2.53 per domestic LTM, or about \$13.74 for each vehicle that needs to be upgraded. The costs for meeting the requirements for medium and heavy trucks (over 10,000 lbs GVWR) are estimated to be about \$54 per vehicle. The total costs of meeting the standard's requirements for all trucks, buses and MPV's are estimated to be under \$18,000,000.

The agency made its estimates of costs on a company-by-company basis. In order to assure that its estimates were correct, the agency enlisted an outside contractor to independently assess the costs that would be involved. As the preamble to the January 1981 final rule explained more fully, the report substantially verified the cost estimates of the agency. Both the contractor's report and the agency's Regulatory Evaluation, which were available to the public in the docket, indicated the models which would require upgrading and the nature of the changes needed.

Comments received from Ford and Chrysler on the notice of proposed rulemaking suggested that a greater number of vehicles would be affected by the standard than estimated by the agency. However, those comments gave only generalized bases for that assertion. While those commenters cited some additional braking system components that might require changes, they did not specify which vehicles would require changes or indicate what the nature or costs of those changes would be. Neither Chrysler's petition for reconsideration or that of Ford provided such information.

The agency contacted Chrysler to obtain clarification of that company's assertions about the costs of the standard. As explained above, Chrysler provided information concerning changes that would be required as

a result of the parking brake requirements. That company also provided test data to substantiate that information. Largely on the basis of that information, the agency changed the parking brake requirements and amended its cost estimates concerning those requirements. Chrysler did not provide information concerning the costs of the other requirements of the standard. In the absence of information contradicting the detailed studies on costs made by both the agency and an outside contractor for those other requirements, the agency continues to believe that its cost estimates are correct.

The agency also contacted Ford to obtain clarification of its assertions about costs. Ford's petition stated that the amendment would result in \$10,000,000 of certification related costs for that company and cause it to raise the suggested retail prices of its LTM's by an average of \$11 per vehicle. By contrast, the agency's estimate of certification costs for Ford is only \$130,000. Ford did not discuss the \$130,000 figure, which was included in the Regulatory Evaluation, in its comment on the notice of proposed rulemaking.

In response to the agency's request for clarification, Ford indicated that of the \$11 increase in costs that it projects, \$8 is related to increased quality control by parts suppliers and \$3 represents amortization of a \$10 million initial investment. Of the \$10 million, \$7.5 million was said to be for the purchase of nine chassis dynamometers and the upgrading of nine other dynamometers to be used to check brake performance at their nine truck plants. The remaining \$2.5 million was attributed to engineering costs associated with compliance certification and quality control.

In setting the requirements for the amendment, the agency specifically took into account production variability. All manufacturers balance their level of quality control with the margin of compliance that they believe is necessary to be confident of 100 percent compliance. By designing braking systems for a level of performance which provides a sufficient margin of compliance to account for production variability, the substantial quality control costs cited by

Ford should be made unnecessary. The agency took those factors into account when making its cost estimates and assumed that manufacturers would upgrade their vehicles' braking systems, where necessary, to provide a margin of compliance so as to make substantial quality control costs unnecessary. Further, the test requirements of Standard No. 105 do not specify the use of chassis dynamometers. While such devices may be useful for the purposes of quality control in checking such vehicle components as braking systems, speedometers, and emissions systems, their use is neither necessary nor sufficient to assure compliance with Standard No. 105.

On the issue of benefits, the Brake System Parts Manufacturers Council (BSPMC) cited in its petition a statement made in *The Automobile Calendar* by the United States Regulatory Council that NHTSA cannot predict the precise level of safety improvement resulting from the January 1981 final rule because of the isolated effect of a number of interrelated accident factors, such as driver performance, vehicle responsiveness, and the variable characteristics of the highway and environment. That statement was cited by BSPMC as evidence that the agency does not know the benefits that the final rule will entail.

Both the notice of proposed rulemaking and the preamble to the final rule explained that in carrying out the mandate of the National Traffic and Motor Vehicle Safety Act to issue vehicle safety standards to protect the public against unreasonable risk of vehicle accidents and of death and injury occurring as a result of such accidents, the agency is confronted with inherent problems that limit the degree of precision achievable in estimating the benefits of proposed standards. Engineering and accident analyses can clearly demonstrate that certain vehicle improvements will facilitate the performance of the driver's task and thereby improve safety. In this case, there is also a study showing that reducing stopping distances will reduce accidents. However, it is virtually impossible to isolate individual factors to arrive at precise and certain

conclusions about the quantified benefits that will accrue.

The notices explained that given the duty to act under this precautionary statute in the area of accident avoidance notwithstanding an inherent measure of imprecision and uncertainty, the agency has developed and issued accident avoidance standards while attempting within its capabilities to quantify the benefits of the standards and limit the uncertainty. Before issuing the proposal to amend Standard No. 105, the agency carefully evaluated and estimated the benefits that will accrue from the amendment. Those estimates were included in the Regulatory Evaluation prepared by the agency and made available to the public.

Ford's petition challenged the statement in the Regulatory Evaluation that an average 4 percent reduction in stopping distance capability will produce a 5 to 9 percent reduction in accidents where brakes are used. That statement, which was based on a study by the Institute for Research in Public Safety (IRPS), was used by the agency in projecting a reduction of 1,700 to 3,500 LTM-related accidents in the first year after the requirements became effective. The preamble to the final rule discussed the IRPS study at some length in response to a comment by Ford.

Ford's petition did not discuss the agency's response to its comment regarding the IRPS study. Instead, Ford stated that it is "obvious" that a minor improvement (such as 4 percent) in the maximum stopping distance capability of a vehicle can be utilized only in a very small proportion of accidents (well under 5 percent). That commenter concluded that reductions in LTM accidents would be limited to only the 5 percent of accidents in which this maximum capability was utilized. According to Ford, that would make the projected benefits virtually disappear.

Ford's petition gave no basis for its assertion that it is "obvious" that a 4 percent improvement in the maximum stopping distance capability of a vehicle can be utilized only in a very small proportion of accidents. Nor did Ford cite any source for its 5 percent figure. As noted above, the agency factored

into its estimates of benefits the fact that brakes are used in about 50 percent of accidents. The 50 percent figure is derived from the IRPS study.

Moreover, in addition to the projected reduction of 1,700 to 3,500 LTM-related accidents in the first year after the requirements become effective, the improvement in stopping distance capability will provide benefits in accident situations where brakes are used but the accident is not prevented. Those benefits will result from the fact that the vehicles will be traveling at a slower rate of speed when the accident occurs, thereby reducing the severity of the accident. For example, assuming a vehicle's maximum stopping distance capability is utilized from a speed of 60 mph, at the point where the improved vehicle is going less than 2 mph, the unimproved vehicle would have been going about 13 mph. At the point where the improved vehicle is going 10 mph, the unimproved vehicle would have been going about 16 mph. In the absence of information contradicting the agency's estimates of benefits or the studies on which they are based, the agency continues to believe that its estimates of benefits are correct.

NHTSA has considered the economic and other impacts of the January 1981 final rule and this amendment and has determined that they are not major within the meaning of Executive Order No. 12291. The agency has further determined that they are not significant within the meaning of the Department of Transportation regulatory procedures. Copies of the agency's Supplement to the Final Regulatory Evaluation may be obtained by writing NHTSA's Docket Section at the address given at the beginning of this notice.

Although NHTSA has considered the effects of these amendments on small businesses, the agency has not prepared a regulatory flexibility analysis. Such an analysis is not necessary in this case, since the Regulatory Flexibility Act applies only to rules for which an NPRM was issued on or after January 1, 1981. The NPRM for the extension of Standard No. 105 to trucks,

buses and MPV's was published in October 1979.

The agency has also analyzed these amendments for purposes of the National Environmental Policy Act and has determined that they will not have a significant effect on the human environment.

Issued on December 15, 1981.

Raymond A. Peck, Jr.
Administrator
46 F.R. 61887
December 21, 1981

PREAMBLE TO AN AMENDMENT TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 105

Hydraulic Brake Systems

[Docket No. 70-27; Notice 28]

ACTION: Final rule.

SUMMARY: This notice amends Standard No. 105, Hydraulic Brake Systems, to provide an optional test procedure for trucks, buses other than school buses, and multipurpose passenger vehicles (MPV's) with a gross vehicle weight rating (GVWR) of greater than 10,000 pounds. The standard becomes applicable to these vehicles on September 1, 1983. The amendment permits manufacturers to meet the partial failure requirements after conducting the standard's full test sequence preceding the partial failure test instead of the abbreviated test sequence generally specified for these vehicles. Under this option, manufacturers continue to be required to meet only the requirements of those tests in the abbreviated test sequence.

EFFECTIVE DATE: September 1, 1983.

SUPPLEMENTARY INFORMATION: Standard No. 105, Hydraulic Brake Systems, provides that vehicles must meet a variety of performance requirements when tested according to a lengthy list of test procedures and in the sequence in which the procedures are listed by the standard. Currently, the standard is only applicable to passenger cars and school buses. However, effective September 1, 1983, the standard becomes applicable, in whole or in part, to trucks, all types of buses, and multipurpose passenger vehicles. (Final rule published in the Federal Register (46 FR 55) on January 2, 1981; response to petitions for reconsideration published December 21, 1981 (46 FR 61887).)

While Standard No. 105 was extended on a general basis (with some modifications) to vehicles

with a gross vehicle weight rating (GVWR) of 10,000 pounds or less, only limited requirements were made applicable to vehicles with a GVWR greater than 10,000 pounds. (The standard's full requirements already applied to all school buses, including those with a GVWR greater than 10,000 pounds.) The abbreviated test sequence applicable to heavy vehicles other than school buses is similar to the full test sequence, except that many of the tests are eliminated.

On July 14, 1983, in response to concerns raised by General Motors (GM) about an apparent anomaly in the test procedure, NHTSA published a notice of proposed rulemaking (NPRM) in the Federal Register (48 FR 32202) to provide an optional test procedure for heavy vehicles other than school buses. As explained in that notice, the agency was informed by GM that some of its heavy vehicles were having difficulties in meeting Standard No. 105's partial failure requirements under the limited test sequence. (The partial failure test ensures that a vehicle's brakes are capable of bringing the vehicle to a controlled stop in a reasonable distance if a part of the service brake system should fail.) Under the full test sequence, the partial failure test is conducted well into the test sequence, following three effectiveness tests, burnish and reburnish (i.e., break-in or conditioning) procedures, and the parking brake test. Of these various steps, only one, the burnish procedure, is included in the limited test sequence.

GM informed NHTSA that it discovered, late in its compliance testing, that certain of its heavy vehicles, as designed, were unable to meet the partial failure requirements under the limited test sequence. However, the same vehicles would meet the partial failure requirements if tested under the

full test sequence.

According to GM, redesign of some of its heavy vehicle braking systems would be required to meet the partial failure requirements under the limited test sequence. That company stated that in the short run the minimum cost resulting from such redesign would be in excess of \$100 per vehicle, without improving user safety. Annual production of approximately 20,000 vehicles would be affected. Given the economic consequences of this apparent anomaly related to the test procedure, GM requested that the standard be amended to correct it.

After analyzing the issues raised by GM, NHTSA agreed that the standard should be amended. The NPRM explained that the elimination of the other procedures from the limited test sequence could have the effect of increasing the stringency of the later partial failure test. The reason for this is that some brakes tend to become more effective as they are tested, because temperature conditioning improves the friction of the brake pads.

The NPRM also explained that the increased stringency of the partial failure test under the limited test sequence was neither intended nor foreseen by the agency. Indeed, the stopping distances for the partial failure test were based on the assumption that the full test sequence would be conducted. The same stopping distances are applicable to heavy school buses, but they are tested under the full test sequence.

NHTSA proposed that manufacturers be given the option of subjecting their heavy vehicles to the full test sequence preceding the partial failure test instead of the limited test sequence. The NPRM explained that manufacturers would not be required to meet performance requirements associated with the additional tests under this proposed option. However, manufacturers would be required to conduct the additional tests in accordance with the standard's specified test procedures.

Three comments were received by the agency, all of which supported adoption of the proposed amendment. GM commented that the NPRM properly described the situation as an unexpected and unintended increase in test stringency arising solely from the elimination of several test sequence steps in the interest of test efficiency and that the difficulty is only one of procedure and not one that in any way affects motor vehicle safety. That company emphasized that the brake system in question is very similar to that on its school buses of equivalent GVWR and when tested to the full se-

quence schedule, as is the school bus system, meets all applicable requirements.

GM also stated that the proposed solution is the most logical approach to elimination of this unintended increase in stringency. That company noted that giving the manufacturer the option to choose whether its vehicles are tested to the full or abbreviated test sequence enables systems which have been developed to meet the full school bus requirements to also comply when used on trucks, without additional complication, while also allowing a manufacturer which has developed a system to comply with the abbreviated test sequence to use that system without additional testing.

Ford commented that it agrees with the agency's analysis that the elimination of certain procedures from the test sequence applicable to vehicles other than the subject heavy vehicles could have the effect of increasing the stringency of the partial failure test in the abbreviated test sequence, and that it supports the proposed amendment. Chrysler submitted a comment which stated that it concurs with the proposed amendment.

After reviewing the comments, NHTSA has determined that the amendment should be adopted as proposed. An effective date of September 1, 1983, is provided. The agency has determined that an effective date of such short notice is in the public interest given the imminence of the September 1, 1983, effective date for Standard No. 105's applicability to these vehicles, and the optional nature of the amendment.

The agency has considered the costs and other impacts of this amendment and has determined that it is not major within the meaning of Executive Order 12291 or significant within the meaning of Department of Transportation's regulatory procedures. Further, the agency concludes that the economic and other consequences of the amendment are so minimal as not to require preparation of a full regulatory evaluation. Due to the optional nature of the amendment, no new costs are imposed on manufacturers or consumers. The amendment will result in some cost savings to manufacturers and consumers since it eliminates the need for redesign of some brake systems. In the short run, these savings could be relatively high on a per vehicle basis. As noted above, GM indicated that short-run redesign costs would have been in excess of \$100 per vehicle, had the standard remained unchanged. In the longer run, however, NHTSA believes that these savings would probably

be low, since, with a long leadtime, manufacturers could likely redesign their brakes at a much lower cost to comply with the requirements under the abbreviated test sequence.

The agency has considered the effects of this proposal in relation to the Regulatory Flexibility Act. I certify that this amendment will not have a significant economic impact on a substantial number of small entities. Small businesses will be affected by the amendment only to the extent that they are sellers or purchasers of affected vehicles. Small organizations and small government jurisdictions will only be affected to the extent that they are purchasers of affected vehicles. The amendment will result in some lower vehicle prices, thereby benefitting both sellers and purchasers. However, such savings are sufficiently small relative to the purchase price of heavy vehicles, even in the short run when they are expected to be at their highest, that they are unlikely to significantly affect purchasing decisions.

Finally, the agency has analyzed this amendment for §571.105 [Amended].

Section S7 is amended by revising the parenthetical after the first sentence of the paragraph to read as follows:

(For vehicles only having to meet the requirements of S5.1.2 and S5.1.3 in section S5.1, the applicable test procedures and sequence are S7.1, S7.2, S7.4, S7.9, S7.10 and S7.18. However, at the option of the manufacturer, the following test procedures and sequence may be conducted: S7.1, S7.2, S7.3, S7.4, S7.5, S7.6, S7.7, S7.8, S7.9, S7.10 and S7.18. The choice of this option shall not be construed as adding to the requirements specified in S5.1.2 and S5.1.3.)

Issued on August 30, 1983

Diane K. Steed,
Deputy Administrator

48 F.R. 39939
September 2, 1983

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106

Brake Hoses

(Docket No. 1-5; Notice 8)

This notice amends 49 CFR 571.106, Motor Vehicle Safety Standard 106, *Hydraulic Brake Hoses*, by (1) extending its requirements to all motor vehicles and hydraulic, air, and vacuum brake hose, brake hose assemblies, and brake hose end fittings for use in those vehicles, (2) replacing some design-oriented requirements with performance requirements for brake hose, brake hose assemblies, and brake hose end fittings, and (3) establishing comprehensive labeling requirements for brake hose, brake hose assemblies, and brake hose end fittings.

A notice of proposed rulemaking on this subject was published on March 30, 1971 (36 F.R. 5855). It revised and corrected earlier proposed amendments and proposed the elimination of many design specifications in favor of broad performance requirements. This reorientation generated little comment, but extensive comments were received on the details of the proposed requirements.

Tests conducted by the NHTSA Safety Systems Laboratory and comments to the docket both indicated that the extensive sequential testing proposed in the NPRM could be an unpredictable measure of brake hose performance and much sequential testing was eliminated. One of the remaining sequential tests requires that all hose assemblies meet the constriction test as well as any other single test.

Several comments indicated confusion concerning the rule's applicability to components of the brake system. The definition of brake hose now limits the standard to flexible conduits that transmit or contain the fluid pressure or vacuum used to apply force to a vehicle's brakes. This excludes such hose as that from the brake fluid reservoir to the master cylinder, and that from

the air compressor discharge to its reservoir. Chassis plumbing which is flexible falls within the definition of brake hose, as does hose from the engine to the vacuum booster.

In response to continued requests for physical tolerances and related accommodations for testing, it is reiterated that the safety standards should in all cases be considered as performance levels that each vehicle or item of equipment must meet, and not as instructions for manufacturer testing. Thus, a 35-hour continuous flex test procedure sets the minimum performance level that the hose must meet when the NHTSA tests for compliance. The manufacturer may certify this performance level on the basis of interrupted tests as long as, in the exercise of due care, these tests provide assurance that his hose complies and will withstand 35 hours of continuous flexing. In response to another question, the manufacturer must determine for himself how frequently he should test his products to ensure that they comply.

The standard does not establish varying burst strength requirements for different size hose, because all sizes may be subject to extreme pressure conditions. Neither does the standard remove wire-braided air brake hose from the adhesion requirements as requested, because the NHTSA has concluded that properly embedded wire-braided hose will sustain an 8-pound pull, and that no sufficient data exists to exempt wire-braided hose at this time.

Labeling requirements have been modified in response to comments to permit (1) lettering to fit smaller size hoses, (2) antitorque stripes that are "clearly identifiable" in order to accommodate a molding process as well as color-striping, (3) use of fractions to express the hose inside

diameter, and (4) interruption of the second stripe with optional additional information not permitted in the legend that interrupts the first stripe. In this way, the labeling provision requires certain safety-related information expressed in a specified format, and it also permits labeling with additional information by the manufacturer at his option. For example, several comments suggested the use of "air-brake" in lieu of "A" and inclusion of SAE air brake-hose type designations as a part of labeling air brake components. Another comment requested metric labeling. As modified, the standard now permits all this information to be placed on the hose as additional information.

Labeling requirements for brake hose end fitting manufacturers no longer include the assembly completion date. Instead, the assembler is required to place a band on each hose assembly which indicates the assembly completion date. "Brake hose assembly" has been redefined to exclude assemblies containing used components, and this effectively excludes repair operations from the requirements of the standard.

The amendment has been reorganized to clearly indicate that it applies to three types of hose, hose assemblies, and end fittings. The requirements and test procedures for each type of hose have been grouped together for clarity, in response to docket comments.

Changes to the hydraulic brake hose requirements include revision of many sequential tests. The 1,500 psi air pressure resistance test was eliminated as an inappropriate measure of hydraulic brake hose performance. The water absorption test proposed in the NPRM was divided into three distinct tests. The test temperature in the brake fluid compatibility test has been lowered to more accurately reflect vehicle operating conditions and to approach a more suitable test temperature for the specified procedure.

Few changes were made to the vacuum brake hose section. In response to the request of its manufacturers, $\frac{3}{32}$ -inch hose has been added to the performance requirements data. Distinctions between light and heavy duty hose were largely eliminated.

All sequential testing except for the constriction test and one water absorption-tensile strength test has been eliminated from the air brake hose requirements. Comments indicated that the extensive combination of tests was inappropriate to measure the adequacy of traditionally constructed air brake hose. The ultraviolet test has been eliminated until sufficient data is generated to support a minimum performance requirement. The standard has also been modified to allow use of permanent as well as reusable end fittings. As anticipated in the NPRM, outside and inside diameter specifications have been added to the requirements for two types of air brake hose, although these specifications do not require the use of Standard SAE 100R5 fittings as proposed in the NPRM.

The suggested standardization on 100R5 fittings generated the greatest number of comments on the rulemaking. Comments generally agreed that thread engagement and component attachment should be standardized. However, disagreement exists on which fitting is most suitable for standardization. Many comments indicated that type E fittings are predominant in the industry and will be more so in the future and that their non-proprietary design permits manufacture by anyone. The NHTSA has decided, on the basis of the comments received, not to standardize on any type of fitting at this time. This amendment only establishes hose diameters and tolerances intended for use in reusable air brake hose assemblies as a first step toward standardization of the air brake hose assembly. Notice and further opportunity to comment will precede any rulemaking on the standardization of air brake hose assemblies.

In consideration of the foregoing, Standard No. 106, *Brake Hoses*, 49 CFR Part 571.106, is amended to read as set forth below.

Effective date: September 1, 1974.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on November 5, 1973.

James B. Gregory
Administrator

38 F.R. 31302
November 13, 1973

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106**Brake Hoses****(Docket No. 1-5; Notice 9)**

This notice amends Standard No. 106, *Brake hoses*, 49 CFR 571.106, to require a manufacturer designation in place of the manufacturer identification code assigned by the National Highway Traffic Safety Administration (NHTSA) which is presently required by the labeling provision.

The NHTSA has not completed consideration of comments to its manufacturer's identification code proposal published June 7, 1973 (38 F.R. 14968). General Motors has stated that production of 1975 model vehicles that conform to Standard 106 will require the immediate manufacture of brake hose that conforms to Standard 106. This amendment modifies the identification requirements to permit the use of manufacturer designations, such as those presently in use, until the NHTSA issues a final rule on the manufacturer's identification code proposal. At that time the standard would be amended again to require whatever code might be assigned by the NHTSA.

Other matters raised by petitions for reconsideration are presently under consideration and

will be answered in accordance with the procedures of 49 CFR 553.35, *Petitions for reconsideration*.

In consideration of the foregoing, Standard 106 (49 CFR 571.106) is amended

Effective date: January 29, 1974. Because this amendment creates no additional burden, and because of the immediate need for an effective requirement applicable to equipment to be produced for the 1975 model year, it is found for good cause shown that notice and public procedure thereon are impracticable, and that an immediate effective date is in the public interest.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on January 23, 1974.

James B. Gregory
Administrator

39 F.R. 3680
January 29, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74

Brake Hoses

(Docket No. 1-5; Notice 10)

This notice responds to petitions for reconsideration of amended Standard 106, *Brake hoses*, 49 CFR 571.106, published November 13, 1973 (38 F.R. 31302). In response to comments by 36 manufacturers and users of brake hoses, the National Highway Traffic Safety Administration (NHTSA) amends the definitions, labeling, and performance provisions of the standard in several respects.

The Motor Vehicle Manufacturers Association, the American Trucking Association, and three manufacturers questioned the applicability of the standard to nylon and thermoplastic tubing used in the chassis plumbing of air brake systems. They asserted that Notice 7 offered no opportunity for comment on the properties and use of this material and that no safety need could justify its inclusion in the standard. The comments point to a distinction in industry terminology between "tubing" and "hose" to argue that NHTSA use of the term "hose" limited the proposal to traditional applications of six SAE hose types at articulating points in the air brake system.

The NHTSA considers that the broad definition of "Airbrake hose" provided an opportunity to comment on the issue of tubing. Notice 7 defined "Airbrake hose" as "a flexible hose for use in an airbrake system . . ." and it clarified this definition in the preamble to the notice.

Major revisions have been made in the airbrake hose portion of the proposal by eliminating the six types previously specified. Thus an airbrake hose under the proposal may be manufactured from any material as long as the hose can meet the performance requirements of the standard.

The NHTSA included "flexible" in its definition of hose, despite the common meaning of hose as

flexible pipe or tubing, to emphasize the exclusion of relatively inflexible elements of an airbrake system such as copper tubing commonly found in chassis tubing. Finally, the broad term "air brake system" adequately gives notice of the standard's applicability to the chassis plumbing portion of that system. The NHTSA determined that a safety need exists to include flexible chassis plumbing in this standard because it is used in the same environment as hose located at articulating points and is subject to many of the same types of stress, including heat, cold, and pressure. A failure of either flexible conduit creates as great a safety hazard. For these reasons, the petitions that tubing be excluded from the standard are denied.

Manufacturers who commented on the use of nylon and thermoplastic in air brake systems expressed confidence that their products, which are in widespread use as chassis plumbing, will meet the requirements of the standard. They requested testing to exclude inadequate materials which might also meet the present requirements. The NHTSA expects to propose additional requirements after review and testing demonstrate that traditional hose materials presently in use will not be excluded arbitrarily. In the interim, the NHTSA's safety defect authority can prevent the use of inadequate materials.

To accommodate the inclusion of nylon and thermoplastic, the comments also requested a revision of the tensile strength value for the smaller nylon and thermoplastic hose. This change has been made. It should be stressed that the applicability of this standard to nylon and thermoplastic tubing does not affect tubing construction or characteristics.

"Brake hose" is defined in the final rule as "a flexible conduit that transmits or contains the fluid pressure or vacuum used to apply force to a vehicle's brakes." Wagner Electric and several other manufacturers argued that a definition like this which differs from accepted industry terminology should include a list of the parts of the brake system it covers. Actually, the use of general language different from industry terminology is specifically intended to avoid identification with specific designs and thereby permit the definition to accommodate future designs as they develop. The preamble refers to specific lines only in response to manufacturer requests for interpretations, and the NHTSA will continue to provide interpretations to interested persons upon request. The NHTSA interprets the term "flexible" to exclude copper or steel tubing. In response to Chrysler, General Motors, Ford, and Mercedes-Benz, the NHTSA reiterates that the vacuum and hydraulic booster lines that service power brake systems transmit or contain pressure used to apply force to a vehicle's brakes within the meaning of the definition. Accessory air lines such as those to the power air horn and windshield wipers are, of course, excluded.

The definition of "brake hose assembly" in the rule covered both combinations of clamps and hose and combinations of end fittings and hose. The NHTSA has deleted reference to clamps, in agreement with manufacturers who pointed out that the mounting of a slip-on clamp and hose is an essentially different manufacturing operation that, if regulated, should be subject to different performance requirements from brake hose assemblies. The clamp assemblies are subject to NHTSA safety defect authority. Comments disagreed for various reasons on the exclusion of hose assemblies containing used components from the standard. The NHTSA concludes that the exclusion is realistic and justified.

The standard now defines "permanently attached end fittings" to make clear that 3-piece hose fittings which utilize sacrificial sleeves or ferrules are permanently attached end fittings and that the hose used with them is not prohibited by S7.1. In addition to the action taken with respect to the definition, $\frac{3}{8}$ -in and $\frac{1}{2}$ -in hose sizes have been added to Table III under

both Type I and Type II hose in order that their use may be continued.

The definition of "rupture" has been modified slightly to make clear that the two types of failure included in the definition are "separation of the hose from its end fitting" and "leakage". Both a small leak and a hose burst constitute "leakage" under this definition.

Manufacturers of brake hose assemblies and vehicles petitioned for numerous variations in the labeling provisions. The many proposed changes in brake hose assembly labeling illustrate the importance of uniform labeling in a field where differing combinations of responsibility exist between manufacturers and installers of hose assembly components.

The NHTSA has determined that the basic assembly banding technique set forth in Notice 8 remains the clearest uniform identification method for assembly manufacturers. The band may be freely attached at any point on the assembly to minimize binding and wear as long as it is retained by the end fittings. An exception to the banding requirement has been made for the vehicle manufacturer who assembles and installs his own brake hose assemblies, because his assemblies are integrally related to the vehicle, and the vehicle certification and identification information serves to identify and certify the hose assembly. The manufacturer may choose to band those hose assemblies subject to being rebuilt, to delimit his responsibility in the event a rebuilt assembly fails.

Manufacturers will be permitted to mark the date of manufacture by day or month on the assembly and hose. The identification code required on each component is not yet available for issuance and therefore an amendment of the standard has already been issued to permit use of a manufacturer designation in place of the code (39 F.R. 3680, January 29, 1974). That language has been revised to allow the use of a manufacturer designation that does not consist of the block capital letters otherwise required by S5.2.2, S5.2.3, and S5.2.4.

The labeling requirements now reflect the use of nominal inside and outside diameter designations. The hose labeling has been modified from "not less than 6 inches" to "not more than

6 inches" in response to many requests. Toyota's request for one-stripe labeling of required and optional information has been denied, to ensure that the required information appears at least once on hose as short as 4 inches. The NHTSA has denied requests for rearrangements of the required information, concluding that they would not make it clearer to the user. In response to Midland-Ross' request for clarification, it is reiterated that, while the NHTSA requires certain safety-related information expressed in a certain format, it does not prohibit the addition of other information elsewhere on hydraulic, air, or vacuum hose.

Several manufacturers of hydraulic brake hose assemblies argued that end-fitting labeling information becomes meaningless once a fitting is permanently attached to a hose. They reasoned that the crimping process deforms the fitting, its coating, and possibly the lettering, so that no fitting manufacturer would certify his product to the assembler, and that the responsibility for the fitting's conformity would in any case fall on the assembler.

While the NHTSA expects the labeling information to serve a useful purpose on reusable and 3-piece permanently attached end fittings, the limited benefit of markings on a crimped fitting justifies their elimination. In fact the one performance requirement that applies to fittings has been modified to reflect the crimping process and it effectively becomes the assembler's responsibility to meet this corrosion resistance provision.

There were several general comments on the performance requirements and the test procedures. There were requests for physical tolerances, especially for the expansion test apparatus, and related accommodations for test purposes. These arise from misunderstanding of the legal nature of the safety standards, which are performance levels that each vehicle or item of motor vehicle equipment must meet, and not instructions for manufacturer testing. In the case of a calibration factor, for example, the NHTSA set an exact performance level by stating its requirement without a tolerance. Then, in compliance testing, it determines the calibration factor of its equipment and gives the benefit of that factor to the manufacturer in assessing the test results.

Correspondingly, the manufacturer should deal with an exact performance level by determining the calibration factor of his equipment and penalizing his test results by that amount. Manufacturer testing should be directed at proving the equipment's capability in the exercise of due care, by testing under conditions at least as adverse as any that could be established in accordance with the procedures. For example, to accept Goodyear's suggested room temperature range of 65° to 90°F. would permit the NHTSA to test at any temperature within the range, and a manufacturer would correspondingly have to test to assure himself that his product would conform at every point within the range.

Toyota expressed some confusion about sequential testing. As stated in S5.3, S7.3, and S9.2, a particular hose, end fitting, or hose assembly need not meet further requirements after having met the constriction requirements and any one other requirement listed. A particular hose assembly, therefore, would have to meet the constriction requirement in each case and then one other selected requirement, of which S5.3.6, *Water absorption and tensile strength*, is one example.

The constriction requirement requires that any cross section which the NHTSA chooses to examine will be a certain percentage of the nominal diameter. Again the manufacturer may utilize whatever test method convinces him in the exercise of due care that his product conforms to the constriction requirement. Chrysler objected to the application of the constriction test to hose assemblies, citing situations where restrictions are designed into brake systems for pressure control. The NHTSA has determined that the established percentages limit constrictions to a safe level.

With regard to the requirements as a group, it is noted that, while a hose must conform to any of the requirements, it need not be tested to requirements that are obviously inapplicable. For instance, thermoplastic tubing need not be subjected to the adhesion test because it is obvious that there are no layers in this constriction which could fail to adhere.

Numerous comments were addressed to specific hydraulic performance requirements. The expansion and burst-strength requirements included a

30-minute waiting period, which has been eliminated as unnecessary. The procedure is modified to better describe the test sequence, and two values in Table I are corrected.

With regard to mounting hose assemblies having L-shaped end fittings in a flexing machine, the test procedures have been modified to permit the use of adapters to secure the assembly to the machine with the same orientation as a straight assembly.

The low-temperature resistance test for hydraulic hose has been modified from -65°F . to -40°F . in line with air and vacuum hose test values.

A hydraulic hose assembler objected that use of SAE RM-1 compatibility fluid had not been proposed in Notice 7 and therefore could not be specified in the final rule. Notice 7 proposed use of "brake fluid conforming to Standard No. 116." This means that the NHTSA could have chosen any such fluid for use in its tests, and that the manufacturer would have to test with each fluid or otherwise assure himself in the exercise of due care that his hose assembly could meet the requirements using each fluid conforming to Standard No. 116. Specification of a single fluid is therefore a relaxation of the proposed requirement. The Society of Automotive Engineers Referee Materials Subcommittee, which contracts for production of RM-1 fluid, has assured the NHTSA of its continued availability for at least the next 3 years. A modification of the requirements has been made for mineral-type systems.

The NHTSA agrees with Wagner Electric that the end fitting corrosion requirement must accommodate the crimping and labeling process, and the requirement is amended to permit displacement of the protective coating necessary to mark the fittings and attach it to a hose.

Several comments were addressed to the air brake hose requirements. Clarifying language has been added to make clear that air brake hose assemblies may be constructed with permanent or reusable end fittings. Table III now includes A- and B-type hose in $\frac{3}{8}$ - and $\frac{1}{2}$ -in special diameters to assure its continued availability, particularly for replacement purposes. The constriction test value of 66 percent remains unchanged because the calculation method is

already consistent with hydraulic value of 64 percent.

Table IV is revised to include outside dimensions. New, smaller radii for tubing tests cannot be adopted, however, until there has been notice and opportunity to comment. In answer to Toyota's request for interpretation, it is correct that the test cylinder radii are directly proportional to the diameter of the hose being tested. Suggestions to examine the inner as well as outer layers of hose subjected to the low-temperature resistance test will be considered in future rulemaking, since interested persons should be given notice and opportunity to comment. The same considerations apply to Samuel Moore Company's suggested higher test temperature in the oil-resistance requirement, more demanding percentages in the length change requirement and the high-temperature burst strength test. The oil resistance test specimen has been modified to one-third of an inch in width because $\frac{1}{2}$ -in specimens can not be cut from the smaller hose sizes. The burst strength value is reduced to 800 psi to accommodate nylon and thermoplastic tubing while retaining a safety performance level five times that of normal operating conditions.

The application of air pressure has been retained in the length change test and the air pressure test, despite requests for "optional" pressure sources. Hidden options of this type are generally undesirable in the safety standards, since they make uncertain the level of required performance, and complicate the comparison of manufacturer and NHTSA test results. The manufacturer is free to use pressure sources other than air as long as his results assure him that the hose would meet the requirement if air were used.

Manufacturers proposed alternative means of testing the adhesion of hose layers because of the difficulty associated with testing wire-braided and small diameter hose. As pointed out in the petitions, sufficient care in conducting the present test will prevent these difficulties. Any manufacturer who believes that the alternative procedure has significant advantages should submit a petition for rulemaking with supporting data.

Some comments on the adhesion test argued for the averaging of test results without specifying any objection to the present procedure. At this time, it does not appear that averaging would be desirable for purposes of this standard. In another area, some tensile strength test values have been reduced in recognition of the use of tubing in nonarticulating applications. The distinction between permanent and reusable fittings is eliminated, consistent with the rationale that the components may operate under the same conditions.

The NHTSA denies Wagner Electric's requested re-establishment of the air pressure test procedures which appeared in Notice 7. These procedures were modified because comments objected to the measuring technique. As noted previously, the manufacturer may use any test method which assures him the equipment meets the requirement as stated.

One significant question was raised with regard to the vacuum hose requirements. Table V inadvertently listed the same hose lengths and cylinder radii for the low and high temperature resistance tests. A new column of values is added to that table.

Because of the additional leadtime required to purchase conforming brake hose and assemblies for use in vehicles which must conform to the standard, the effective date of the standard as it applies to vehicles is delayed 4 months to Jan-

uary 1, 1975. An amendment to the presently effective Standard 106 permits compliance either with that standard or with this standard, as it is effective September 1, 1974.

Interested persons are reminded that, in addition to the amendments set forth below, an amendment of Standard 106 has already been issued which permits the use of a manufacturer designation in place of the identification code called for in the rule as first issued. (39 F.R. 3680, January 29, 1974.)

In consideration of the foregoing, both Standard No. 106, 49 CFR 571.106, in its presently effective form and Standard No. 106 as it is effective September 1, 1974, and January 1, 1975, are amended.

The present Standard No. 106 is amended by the addition of a new paragraph

Effective dates: September 1, 1974, for equipment covered by the standard; January 1, 1975, for vehicles to which the standard applies.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on February 20, 1974.

James B. Gregory
Administrator

39 F.R. 7425
February 26, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74

Brake Hoses

(Docket No. 1-5; Notice 11)

This notice amends Standard No. 106, *Brake hoses*, 49 CFR 571.106, by modifying the definition of "permanently attached end fitting", the effective date for brake hose assemblies and vehicles, several labeling requirements, and certain tensile strength, constriction, and corrosion resistance requirements, in response to petitions for reconsideration of amendments published January 29, 1974 (39 FR. 3680) (Notice 9) and February 26, 1974 (39 FR 7425) (Notice 10). In addition, Toyo Kogyo Company, in a letter request for interpretation, pointed out an inadvertent change of language in Notice 8 (38 FR 31302, November 13, 1973) which is corrected in this notice.

Notice 9

Notice 9 amended the standard to permit the use of "a designation that identifies the manufacturer" of an end fitting, hose or hose assembly in place of a manufacturer identification code which the NHTSA is not yet prepared to issue. Any designation which is filed with the NHTSA may be used until the permanent code is implemented. The only comment on Notice 9 was made by Weatherhead Company, which objected to any interim marking on grounds of expense and advocated elimination of all label identification from the hose. The NHTSA considers identification other than a colored thread to be reasonable and necessary for rapid recognition, and Weatherhead's first petition is denied.

Although not raised by Weatherhead in its petition, several assemblers have objected that the manufacturer designation requirement conflicts with the general industry practice of marking hose with the distributor's designation. The NHTSA requirement that the manufacturer designation appear on one side of the hose in the

required format does not in any way prevent labeling of hose with the distributor's designation on the opposite side of the hose along with other optional information.

Weatherhead petitioned for revision of the identification requirements to permit designations other than block capital letters and numerals. The necessary language has already been added to the standard in Notice 10.

Weatherhead also requested a modification of the definition of "end fitting" that would exclude end fitting components from the labeling requirements in order to accommodate the practice of assembler intermixing of components made by different manufacturers. Such an exclusion of components, combined with the present exclusion of labeling crimped-on fittings, would eliminate all identification requirements for all fittings. While unlabeled crimped fittings may be traced through the hose assembler's band, "renewable" or reuseable fittings must be labeled at least once to permit location of any defective fitting which was attached to new hose and then reused after it passed out of the control of the assembler and the NHTSA. Although the NHTSA does not find labeling of each part of a fitting to be feasible, it does not consider it unduly burdensome for an assembler to ensure that the newly assembled fitting is composed entirely of parts made by the manufacturer whose designation appears on one part. This also responds to International Harvester's request for interpretation on labeling multi-piece fittings.

Notice 10

Notice 10 amended the standard in response to petitions for reconsideration of the regulation as it had been issued in final form November 13,

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March 1, 1975
September 1, 1975

1973 (38 FR 31302). The twelve petitions for reconsideration of this notice emphasized confusion over the status of hose, fittings, and assemblies manufactured before the effective date, and disagreement with certain labeling requirements and the applicability of the standard to particular hose types and applications.

The use of hose and fittings manufactured before the September 1, 1974, effective date raises two problems. The most difficult of these problems is that the components may not conform to any or all of the performance requirements of Standard 106, and therefore could not be made into assemblies or vehicles after the appropriate effective date. To alleviate this "existing stock" problem, Notice 10 delayed the effective date of the standard for vehicles 4 months to permit the utilization of non-106 components. This did not solve the problem, however, as pointed out by Ford and by White Motor Corporation, because the hose and fittings made immediately before the effective date must be made into assemblies after the effective date before they can be used in vehicles. This notice therefore delays the effective date of the standard for six months as it applies to assemblies. The March 1, 1975, date is set with reference to materials submitted by vehicle and hose and fitting manufacturers that support a delay somewhat longer than 4 months to absorb existing stocks. Because it will take some months to stock inventories with conforming assemblies after March 1, 1975, the effective date of the standard for vehicles is delayed until September 1, 1975.

The delay in effective date for assemblies and vehicles will minimize difficulties in the transition to hose marked with the DOT symbol. This transition problem arises because of the requirement that the DOT appear on conforming hose, fittings, and assemblies, but that it not appear on hose to which no safety standard applies, that is, hose manufactured before the standard's effective date. This principle has been consistently followed in the labeling of tires and other items of motor vehicle equipment to avoid confusion in the meaning of the symbol and the concept of compliance. The problem does not arise in the labeling of hydraulic hose for use in passenger cars because a standard already applies and the

DOT symbol can be used to indicate compliance with it.

The difficulty in labeling brake hose with the DOT symbol is not that of a September 1, 1974, "midnight changeover". The problem is that any hose assemblies used in new vehicles must conform to the standard as of the effective date for vehicles. With the present change, the hose and fittings used as original equipment must bear the DOT symbol as of September 1, 1975. The new effective dates provide six months to absorb pre-standard stock in assemblies and then six more months to prepare conforming assemblies for use in 1976 model vehicles. What stock remains can, of course, be sold in the replacement market.

The greatest number of petitions concerned the applicability of the standard to specific hose types and applications in the vehicle. Three petitions again sought the exclusion of plastic tubing from the standard, stating reasons which have already been responded to in detail in the preamble to Notice 10. The major concern in this area appears to be whether specific tubing assemblies are subject to the high tensile strength tests for "relative motion". This term has raised numerous requests for interpretation, and to make clearer the tensile strength distinction, "relative motion" has been replaced with more specific wording. The new language specifies that hose assemblies (other than coiled nylon tube assemblies which meet the requirements of BMCS Regulations (49 CFR § 393.45)) used between chassis and axles or between towing and towed vehicles must meet the higher tensile strength requirements.

The American Trucking Association (ATA) mistakenly concluded that the signal line between tractor and trailer was totally excluded from the standard, and also the line to any reservoir and to the spring brakes. All these lines fall within the definition of brake hose because the signal pressure, the pressure to the reservoir, and the pressure to the spring brake chamber in each case is "used to apply force to the brakes". This wording should not be misread as restricted to pressure directly used to *apply* the brakes.

The definition of brake hose has been reworded to avoid a problem in another area. As presently worded only hose actually used in the brake sys-

tem would qualify as brake hose and be entitled to be labeled with the DOT symbol. The rewording permits hose "manufactured for use in a brake system" to be labeled with the DOT symbol even if it is used, for example, as a supply line to the windshield wiper system.

Weatherhead requested further definition of the term "flexible" as it is used in the definition of brake hose. The NHTSA continues to believe that this concept can best be treated on a case-by-case request for interpretation and, as noted in Notice 10, will continue to make interpretations upon request.

Chrysler petitioned for a change in the wording of the definition of "brake hose", apparently directed toward the exclusion of the hydraulic brake booster assembly from the standard. Ford, General Motors, and the Motor Vehicle Manufacturers Association (MVMA) also petitioned to exclude the hydraulic booster lines on the grounds that they are subject to a different working environment than brake hose. The most important difference is the constant flow of fluid through them, requiring a long, complicated, tuned, and expandable hose. The NHTSA has concluded that the difference in requirements for the hydraulic booster system justifies special performance requirements for this application. Until these requirements are developed, hydraulic brake booster hose running from pump to accumulator will be considered to be exempt from the requirements of this standard. Hose running from accumulator to booster will also be exempted if redundant booster is provided. This exemption applies to hoses for which Rolls Royce petitioned for exemptions from certain test requirements.

White Motor Corporation petitioned to include "the chassis portion" in the definition of brake hose assembly, incorrectly assuming that the discussion of chassis plumbing in the preamble to Notice 10 limited the definition to brake line mounted to the frame at one point. Chassis plumbing was emphasized in Notice 10 only because inclusion of that part of the brake system in the standard had been questioned by several petitioners. In answer to White, Standard No. 106 is not limited to hose "installed on the chassis to the point of the last mechanical connection",

but includes any hose equipped with end fittings for use in a brake system.

The ATA expressed dissatisfaction at the applicability of hose assembly requirements to assemblies made in the field from all-new components. The NHTSA has accommodated emergency repairs by excluding hose assemblies which contain used components, whether renewable or reusable. There is no reason, however, to routinely exempt the smaller assemblers from the requirements of the standard simply because past practices have permitted fabrication of assemblies in the field by anyone who has the necessary equipment. In this regard, the NHTSA believes the practice of refabrication of hose assemblies in the correct length in the field for emergency repairs promotes safety, by not forcing substitution of a permanent assembly which is only a "close fit". For this reason Weatherhead's petition to require permanent fittings on all brake hose is denied.

Several questions were raised with regard to end fittings. Most important to manufacturers is elimination of the reference to two- and three-piece end fittings in the definition of permanently attached end fittings. This definition, as well as the reference in S5.2.3, has been changed to eliminate this design restriction.

The status of intake manifold connectors and booster check valves typically clamped to the ends of vacuum booster hose were also questioned. "Brake hose end fitting" is defined as "a coupler, other than a clamp, designed for attachment to the end of a brake hose." As typically configured, the couplers are the clamps, and the intake manifold connection and brake booster check valve are engine components to which the brake hose has been attached by the clamp couplers. Therefore neither component is subject to Standard 106.

Several petitions addressed the labeling of fittings, as well as hose and assemblies. Two of the major concerns, use of the DOT symbol and the marking of multi-piece end fittings, have been discussed earlier.

Labeling of brake hose "at intervals of no more than six inches, measured from the end of one legend to the beginning of the next" can create several problems; for example, spray painting of a vehicle frame in which hose has been

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March 1, 1975
September 1, 1975

mounted. Mack argued that the legend need appear only once on hose which has been made into an assembly and mounted in a vehicle. The NHTSA has concluded that the value of the continuous line and legend, as a ready source of the hose characteristics on bulk hose and as aid to untwisted installation, is exhausted when an assembly has been mounted. Therefore S5.2.2 has been modified to require only that the legend appear at least once on assemblies mounted in vehicles. It is emphasized that masking material used in painting must be removed so that the labeling does appear on the completed vehicle. Only the required information may appear along one side of the hose.

The labeling distance of a maximum 6 inches between legends is intended to ensure adequate repetition on bulk hose without restricting the size of the legend. A manufacturer is free to make the legend as short or long as he feels is necessary to make the information clear, and on this basis, Midland-Ross' petition to require labeling at 6-inch intervals measured from the beginning of one legend to the beginning of the next is denied. Weatherhead expresses confusion over a Notice 10 preamble reference to the complete legend appearing in 4 inches. This statement was only intended to illustrate a situation where a mixture of optional and required labeling would interfere with the appearance of complete labeling on some hose assemblies, and it did not imply a requirement that the legend must be 4 inches long.

Although no manufacturer specifically requested a change, the NHTSA has concluded that clarity would not be substantially degraded by permitting required label information to appear in any order. The requirement for a specific order of label information has accordingly been deleted in order to reduce waste associated with hose cutting. The lettering height of one-eighth of an inch is considered necessary for clarity and will be retained.

Mack requested confirmation that end fitting labeling may be covered with paint until a person strips off the paint to read the labeling. This interpretation is incorrect. To be useful, label information must be clearly visible for easy reference.

Midland-Ross requested clarification of the use of the letters "SP". These letters distinguish, two types of air brake hose: regular 1/2-inch hose and hose that requires special reusable fittings. This is the only situation where different hoses share the same size designation. The NHTSA cannot agree with Midland that wider use of the letters would clarify the use of other components.

Weatherhead challenged as discriminatory the required labeling by manufacturers of hose assemblies other than those assembled and installed by a vehicle manufacturer in vehicles manufactured by him. The argument relied in part on a statutory requirement that "every manufacturer . . . shall furnish to the distributor or dealer at the time of delivery of such vehicle or equipment . . . the certification that . . . [it] conforms . . . in the form of a label or tag . . ." (15 U.S.C. § 1403).

This section covers vehicles and equipment only "at that time of delivery" to a distributor or dealer. In contrast, the exception in question applies to hose assemblies mounted in vehicles by their manufacturers which do not fall under the language of § 1403.

Weatherhead also requested an alternative labeling procedure in place of banding which the NHTSA has determined is not desirable because it detracts from the uniformity of the labeling procedure, and accordingly this petition is denied.

Several manufacturers have requested approval of specific banding techniques, including a molded rubber ring, a metal band crimped together, and an adhesive label which adheres to the hose. The NHTSA interprets a band as a label which encircles the hose completely, and attaches to itself. To constitute labeling at all, the band must, of course, be affixed to the hose in such a manner that it can not be easily removed.

Manufacturers raised objections to the specific performance requirements as they apply to hose types. Manufacturers of hydraulic hose assemblies requested exclusion of various types of end fittings from the constriction requirements to permit L-shaped and T-shaped fittings, distribution blocks, and residual valves, which are designed to have small diameters. The NHTSA

has concluded that the major constriction problems occur in joining the hose to the fitting, and has amended the constriction requirements so that they apply only to that part of the fitting in which hose is inserted.

Weatherhead requested a calibration factor for the expansion test procedure used with hydraulic hose. The NHTSA explained in its last notice that, although calibration factors exist and must be taken into account in any performance test, it is inappropriate to state a calibration factor as part of the performance requirement. Weatherhead's petition is accordingly denied.

Several manufacturers pointed out the inadvertent substitution of "rupture" as the performance requirement to be met in the tensile strength tests of hydraulic hose and air brake hose. This language has been replaced with a requirement of no separation of the end fittings from the hose. With regard to "rupture", it should be noted that the definition of the term was not substantively changed in Notice 10, but only rearranged for clarity.

Another omission has been corrected by the addition of language to the corrosion resistance requirements of air and vacuum brake hose fittings to allow the same displacement of a protective coating which is permitted for hydraulic hose end fittings. It is noted for the benefit of manufacturers who have requested interpretation that discoloration of a brass end fitting is not of itself considered to be corrosion.

Most manufacturers objected to the restrictive elements of Table III, making various arguments for increasing the number of sizes available for use with reusable fittings. Table III, however, is intended to be a first step toward standardization of reusable fittings and hose, and dislocations of former practices must be expected in restricting the choice of available sizes and types. The petitions to eliminate Table III restrictions, or to add new sizes to it, are denied for these reasons. Weatherhead argued that permanent as well as reusable hose should be subject to size limits, but the NHTSA has found that this would be a design restriction without corresponding safety benefit. The hose used with permanent fittings is generally assembled by high volume manufacturers, not repair operations in the field, and the

mismatch problem, to which standardization of reusable hose is addressed, should not occur. The petition is therefore denied.

In response to Parker-Hannifin's inquiry, the NHTSA favors no one fitting type among the choice of reusable air brake fittings.

Stratoflex questioned a leakage requirement in a hydrostatic test of air brake hose when at the same time an air pressure test permits a limited amount of air leakage. The NHTSA makes the distinction on the basis of the rubber composition which permits air but not water to permeate the hose wall.

With regard to vacuum hose requirements, Midland-Ross petitioned for the use of wording in S9.2.9 that appeared in Notice 8, believing it to be more clear than the language substituted for it in Notice 10. On balance, the NHTSA agrees that "adjacent layers" accurately describes heavy as well as light hose construction, and it is re-established. It should be understood that this wording includes separation of the outer cover from the tube.

Toyo Kogyo, in a letter request for interpretation, questioned a language change between the Notice 7 proposal (36 FR 5855, March 30, 1971) and the Notice 8 rule, in S9.2.8. The swell test of vacuum hose called for "no leakage . . . after which there shall be no separation of the inner tube from the fabric reinforcement of the hose." By error, the Notice 8 requirement instead called for no "collapse," which would require absolutely no deformation of the hose in terms of decreased interior diameter. The NHTSA did not intend to increase the requirement and this notice re-establishes the intended performance level. It should be noted that a "no collapse" requirement would have been inconsistent with the shorter vacuum test requirements of S9.2.7.

One manufacturer asked for an explanation of the use of "[Reserved]". This term is used in the Code of Federal Regulations to indicate an omission or deletion, to avoid having to renumber the following units. It does not indicate reservation for any specific purpose.

Several minor changes are made to the standard to correct typographical errors found in Notice 10. It is also noted that the Notice 10

Effective: September 1, 1974
March 1, 1975
September 1, 1975

amendment of S5.2.3 appearing in the *Federal Register* appeared to delete paragraph (e), which in fact remains in the standard.

In consideration of the foregoing, both Standard No. 106 (49 CFR 571.106) in its presently effective form, and Standard No. 106-74 (49 CFR 571.106-74) as it is effective September 1, 1974, are amended,

Effective dates. September 1, 1974, for brake hose and brake hose end fittings; March 1, 1975,

for brake hose assemblies; September 1, 1975, for vehicles to which the standard applies.

(Secs. 103, 112, 114, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1401, 1403, 1407); delegation of authority at 49 CFR 1.51.)

Issued on June 24, 1974.

James B. Gregory
Administrator

39 F.R. 24012
June 28, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74**Brake Hoses**

(Docket No. 1-5; Notice 12)

This notice amends Standard No. 106-74, *Brake hoses*, 49 CFR 571.106-74, to provide that hose assemblies of the same internal diameter are subjected to the same tensile strength requirements. This amendment responds to a petition for reconsideration of the most recent amendments of Standard No. 106-74 (Notice 11) filed by Samuel Moore and Company on July 1, 1974.

The National Highway Traffic Safety Administration (NHTSA) is responding to this petition before considering all other comments on Notice 11 because of the effect of this ruling on Standard No. 121, *Air brake systems*, which becomes effective January 1, 1975, for trailers and March 1, 1975, for trucks and buses. The design and testing of air brake systems for the standard has been based in part on the continued availability and use of $\frac{3}{8}$ -inch OD plastic tubing, a popular substitute for $\frac{1}{4}$ -inch ID hose in some tractor-to-trailer applications. Samuel Moore has pointed out that, although $\frac{3}{8}$ -inch tubing and $\frac{1}{4}$ -inch hose deliver the same air supply under the same circumstances, Standard No. 106-74 subjects the tubing to greater tensile strength requirements than hose. As a result the tubing may have to be withdrawn from the market because it is unable to meet the higher requirements. Designers of the new air brake systems must know immediately if $\frac{3}{8}$ -inch tubing can continue to be used.

The NHTSA intends that all brake hose subject to the standard, including traditional rubber hose and the newer plastic tubing, be subject to appropriate tests for the environment and use in which they serve. In this situation $\frac{3}{8}$ -inch

OD tubing has the equivalent bore of $\frac{1}{4}$ -inch ID hose. The NHTSA hereby amends the standard, by adding "in nominal internal diameter" to S7.3.10 and S7.3.11 following each size designation, to test these products to the same tensile strength requirements.

A typographical error in Notice 11 which changed the meaning of the tensile strength requirements is corrected here by the addition of parentheses around the phrase "other than a coiled nylon tube assembly which meets the requirements of § 393.45 of this title" appearing in S7.3.10 and S7.3.11.

Additionally, Notice 11 attempted to resolve an ambiguity in Notice 10 concerning the deletion of subparagraph (e) of S5.2.2 of the standard. Notice 11 mistakenly referred to S5.2.3, and it should be noted that, in actuality, it was the Notice 10 amendment of S5.2.2 appearing in the *Federal Register* that appeared to delete paragraph (e), which in fact remains in the standard.

In consideration of the foregoing, Standard No. 106-74 (49 CFR 571.106-74) is amended....

Effective date: March 1, 1975.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51.)

Issued on August 2, 1974.

James B. Gregory
Administrator

39 F.R. 28436

August 7, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74

Brake Hoses

(Docket No. 1-5; Notice 14)

This notice amends Standard No. 106-74, *Brake hoses*, 49 CFR 571.106-74, to permit, for a limited time, the manufacturing of brake hose assemblies which comply with the standard in all respects except that they are constructed with hose or end fittings which do not meet certain labeling requirements.

A notice of proposed rulemaking was published on October 3, 1974 (39 F.R. 35676) (Notice 13), which proposed amendment of the standard to facilitate the depletion of inventories of brake hose that is not properly labeled. All of the comments supported the proposal. Several of those commenting suggested that the proposed temporary exception to the labeling requirements be extended to cover end fittings as well as hose. These manufacturers pointed to large inventories of end fittings, manufactured before September 1, 1974, which meet all of the performance requirements of the standard, but which could not be used because they are not properly labeled. As with the brake hose discussed in Notice 13, safety of performance is not a major issue. The NHTSA has determined that the use of both non-conforming hose and end fittings in assemblies manufactured before September 1, 1975, while it may make enforcement by this agency temporarily more difficult, is appropriate and in the public interest.

In its petition for reconsideration of Notice 11 (39 F.R. 24012, June 28, 1974), Wagner Electric Corporation requested an amendment to permit the labeling of brake hose assemblies with DOT-marked bands in accordance with S5.2.4 before

March 1, 1975, the date assembly labeling becomes effective. The NHTSA takes this opportunity to respond to Wagner's petition ahead of other petitions for reconsideration of Notice 11 in order to clarify the standard's scheme of effective dates.

Even though Standard 106-74 has already been published, there are no requirements in it applicable to air brake hose assemblies or to vacuum brake hose assemblies until March 1, 1975. Consequently, use of the DOT symbol on such assemblies manufactured before that date would be inconsistent with the established meaning of that symbol as a certification of compliance with *applicable* standards. Use of the symbol to indicate "anticipatory compliance", as Wagner has suggested, would foster confusion in both the meaning of the symbol and the concept of the certification required by Section 108(a)(3) of the National Traffic and Motor Vehicle Safety Act of 1966. Accordingly, Wagner's petition is denied.

The problem of excessive inventories of pre-standard hose and end fittings arose from incorrect assumptions about the effective date of the standard as applied to hose assemblies which are not completed until the hose is installed in the vehicle. No parallel misunderstanding can arise with respect to the September 1, 1975 effective date for vehicles, so brake hose assemblers can plan their production schedules accordingly.

In consideration of the foregoing, Standard No. 106-74 (49 CFR 571.106-74) is amended by the addition of a new section

Effective: November 11, 1974

Effective date: November 11, 1974. Because this amendment relieves a restriction, the National Highway Traffic Safety Administration finds, for good cause shown, that an immediate effective date is in the public interest.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51.)

Issued on November 6, 1974.

James B. Gregory
Administrator

39 F.R. 39725

November 11, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74

Brake Hoses

(Docket No. 1-5; Notice 16)

This notice amends 49 CFR 571.106-74, Standard No. 106-74, *Brake hoses*, by modifying several labeling requirements and the deformation test requirement for vacuum brake hose, in response to petitions for reconsideration of amendments which were published June 28, 1974 (39 F.R. 24012) (Notice 11). Several of the petitions are denied; others requested changes which are outside the scope of a petition for reconsideration, and will be considered as petitions for future rulemaking.

Ford Motor Company petitioned for relaxation of the labeling requirements of the standard as they apply to brake hose end fittings. Recognizing that labeling of all components of an end fitting is not feasible, the NHTSA in Notice 11 interpreted S5.2.3 to require that all unlabeled components of an end fitting be made by the manufacturer whose designation appears on one part. Ford pointed out that, because end fitting components made by different manufacturers and purchased according to the assembler's specifications are virtually interchangeable, this interpretation would preclude the cost saving practice of purchasing individual components from the source offering the most favorable price. Because most of the performance requirements of the standard apply to assemblies, responsibility for noncompliance and for safety defects will usually belong to the assembler. Accordingly, the standard is amended to require labeling on at least one component of an end fitting, thus permitting the practice of mixing parts from different sources to continue as requested by Ford.

Several vehicle manufacturers petitioned for changes in the interpretation of the labeling requirements, to allow labels on hose and end fittings to be obscured by paint or by masking

materials. New information indicates that spray painting of end fittings leaves their labeling visible in most cases and that, in the occasional instances where labeling is obscured, excess paint may be easily scraped off. In addition, painting protects the labels and fittings against corrosion. Therefore, the NHTSA will not consider the painting of end fittings to be a violation of the standard. Painting of hose labels, however, presents different considerations, because removal of paint from a hose may damage both the label and the hose. Therefore, the label on a hose must remain visible after painting unless it is protected by masking which can be removed manually to permit inspection. Because masking material can protect the label from obscuration by road grime, and because the expense required to remove it after painting does not appear justified, hose labels may remain masked after painting provided that the masking material is affixed in such a way that no adhesive contacts any part of the label.

BMW petitioned for a relaxation of the deformation test requirements for wire-reinforced vacuum hose. S9.2.10 in its present form requires a vacuum brake hose to return to 90 percent of its original diameter within 60 seconds after five applications of force as specified in S10.9. The NHTSA has determined that a reduction of the 90 percent figure to 85 percent will facilitate the use of wire-reinforced hose having greater resistance to collapse under vacuum, and is in the public interest. Therefore, BMW's petition is granted.

The Rubber Manufacturers Association (RMA) and Gates Rubber Company requested an exception to the hose labeling requirement for hose lengths shorter than the length of a complete

legend plus the space between legends. These petitions are denied. The NHTSA has no reason to believe the hose labeling cannot be reduced in length to fit virtually any hose length. The 6-inch distance between legends specified in S5.2.2 is a maximum, and for hose which is to be cut into short lengths, this distance can be reduced or eliminated. Also, lettering width may be reduced because there is no width requirement in S5.2.2 for specified lettering. In addition, Notice 11 modified the standard to permit the required information to appear in any order to facilitate hose cutting.

Kugelfischer Georg Schafer & Co. of Germany expressed dissatisfaction with the banding requirement for brake hose assemblies. Requests to eliminate this requirement were responded to in Notice 10 (39 F.R. 7425, February 26, 1974). Kugelfischer also suggested exemption from the banding requirement of assemblers who manufacture both the hose and end fittings in their assemblies. Such an exemption would make it impossible to identify the assembler of a defective or noncomplying assembly in which hose and end fittings were made by the same manufacturer, and to which no band was attached. Therefore the Kugelfischer petition is denied.

Several manufacturers petitioned for substitution of a ball-vacuum test for the adhesion test described in S8.6 in the case of a hose which is reinforced with wire braid. The RMA petitioned for a change in the method of expressing the results of the adhesion test, to permit averaging of the values recorded on the chart. The NHTSA has tentatively found these petitions to have merit, and is considering the issuance of a notice of proposed rulemaking on these subjects.

Several of the petitions requested changes which are outside the scope of a petition for reconsideration of a rule. A petition for reconsideration is appropriate to assert that the petitioner believes that compliance with the rule as issued is not practicable, is unreasonable, or is not in the public interest, and to suggest changes on that basis (49 CFR 553.35(a)). Requests for new requirements that do not contest the appropriateness of the issued ones are properly submitted as petitions for rulemaking. Gates and the RMA petitioned for an amendment of S7.3.3 to require an internal as well as external inspection

of the hose surface after an air brake hose is subjected to the low temperature resistance test of S8.2. Stratoflex petitioned for changes in S7.3.10 and S7.3.11 to require higher tensile strength values for hoses used in certain applications. Stratoflex also petitioned for the addition to S7.3 of a flexion resistance test for air brake hose. The NHTSA considers these requests to merit further consideration and accordingly, the NHTSA will treat these petitions as petitions for rulemaking.

Several inconsistencies resulted from amendments made to the standard in Notice 11. In one case, the modification of the definition of "Permanently attached end fitting" inadvertently changed the requirements for hydraulic brake hose assemblies in S5.1. The modification was not intended to permit use of renewable fittings in hydraulic brake hose assemblies. Accordingly, S5.1 is amended to require that hydraulic brake hose assemblies incorporate only those permanently attached end fittings which are attached by deformation of the fittings about the hose by crimping or swaging. To correct another inadvertent error, S6.7.2(c) is amended to bring the brake fluid compatibility test for hydraulic hose into conformity with the constriction test as changed by Notice 11. In response to an inquiry from BMW, new entries are made in Tables V and VI to cover $\frac{7}{16}$ -inch diameter vacuum hose. To clarify the meaning of S5.2.2, the words "may appear" in the first paragraph are changed to read "need appear". In addition, several typographical errors have been corrected.

In consideration of the foregoing, Standard No. 106-74 (49 CFR 571.106-74) is amended. . . .

Effective date: March 17, 1975. Because these amendments relieve restrictions and create no additional burdens, the NHTSA finds, for good cause shown, that an immediate effective date is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51)

Issued on: March 10, 1975.

Noel C. Bufo
Acting Administrator

40 F.R. 12088
March 17, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74**Brake Hoses**

(Docket No. 1-5; Notice 17)

This notice delays for 6 months the effective date of the hose label masking requirements of 49 CFR 571.106-74 (Standard No. 106-74 *Brake Hoses*), in order to allow time for public comment on a proposal to eliminate those requirements.

S5.2.2, S7.2, and S9.1 of the standard require certain information to be labeled at intervals of not more than 6 inches on new hydraulic, air, and vacuum brake hose, respectively. Those requirements were effective September 1, 1974, and are unchanged by this notice. S5.2.2, by itself and as incorporated by reference in S7.2 and S9.1, also requires at least one legend of this information to remain either visible after painting and undercoating, or properly masked, on each brake hose in a completed vehicle. This requirement, which as a practical matter requires masking, would become effective September 1, 1975, because it applies to vehicles. The NHTSA intends to propose, in the near future, an amendment of Standard No. 106-74 that would eliminate the requirement entirely. In order to allow time for public comment on the proposal, and to permit vehicle manufacturers to defer preparation for compliance with a requirement which might never become effective, this notice delays

the effective date of the masking requirement. There is no change in the requirement that vehicles manufactured on or after September 1, 1975, be equipped with brake hoses, brake hose end fittings, and brake hose assemblies that comply with the standard.

In consideration of the foregoing, the effective date of the requirement in S5.2.2, S7.2, and S9.1 of 49 CFR 571.106-74 (Standard No. 106-74, *Brake Hoses*), that hose label information remain visible on completed vehicles unless properly masked, is changed to March 1, 1976. Because of the need to allow time for public comment on the prospective proposal to eliminate the requirement, the NHTSA for good cause finds that notice and public procedure on the delay are impracticable and contrary to the public interest.

(Sec. 103, 112, 114, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1401, 1407); delegation of authority at 49 CFR 1.15.)

Issued on July 29, 1975.

James B. Gregory
Administrator

40 F.R. 32336
August 1, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74**Brake Hoses****(Docket No. 1-5; Notice 18)**

This notice amends 49 CFR 571.106-74 (Standard No. 106-74, *Brake Hoses*) to permit, until August 31, 1976, the manufacturing of motor vehicles with brake hose, brake hose end fittings, and brake hose assemblies which comply with all requirements of the standard except certain labeling requirements.

In a notice published on June 28, 1974 (39 FR 24012, Docket No. 1-5, Notice 11), the following scheme of effective dates was established: September 1, 1974, for brake hose and brake hose end fittings; March 1, 1975, for brake hose assemblies; and September 1, 1975, for vehicles to which the standard applies. This scheme was designed to permit an orderly phase-in of parts meeting the new standard, by allowing six months at each production stage for the depletion of inventories of non-conforming parts.

After the September 1, 1974, effective date for hose and fittings, it became apparent that, due to a misunderstanding within the industry of the standard's requirements, stocks of hose and end fittings manufactured before that date would not be completely converted into assemblies by the March 1, 1975, effective date for assemblies. Because the only difference between those non-conforming components and hose and fittings manufactured after September 1, 1974, appeared to be one of labeling, the NHTSA added S12. to the standard. That section extended until August 31, 1975, the period during which such components could be used in assemblies, provided that they met all of the standard's performance requirements (30 FR 39725, Docket No. 1-5, Notice 14).

Since the publication of Notice 14, there has been an unforeseen sharp decline in the produc-

tion of new trucks, causing several component manufacturers, distributors, and vehicle manufacturers to have on hand large inventories of hose and end fittings manufactured before September 1, 1974, and of assemblies manufactured from them before March 1, 1975.

A further extension of the time during which these inventories could be exhausted was requested in petitions for rulemaking filed by Parker-Hannifin Corp., Wagner Electric Corp., Aeroquip Corp., Samuel Moore and Co., Freightliner Corp., and PACCAR, Inc. These petitioners indicated that, without such an extension, components valued at several hundred thousand dollars would have to be scrapped, even though they comply fully with all performance requirements of the standard. The petitioners requested extensions ranging from 6 to 18 months.

As with the inventories which were the subject of the Notice 14 amendment, safety of performance is not a major issue. The NHTSA has determined that, while granting these petitions may continue to make enforcement by this agency more difficult until these inventories are depleted, the avoidance of waste in this situation is appropriate and in the public interest. Accordingly, a 1-year extension is granted. It should be noted that this amendment makes no change in the banding requirement for assemblies manufactured on and after March 1, 1975. S13(c) is merely intended to facilitate the exhaustion of stocks of unbanded assemblies which comply with the standard in all other respects.

Because of the imminent effective date of a requirement which would otherwise lead to substantial economic waste, the NHTSA for good cause finds that notice and public procedure on

Effective: August 27, 1975

this amendment are impracticable and contrary to the public interest.

In consideration of the foregoing, 49 CFR 571.106-74 (Standard No. 106-74, *Brake hoses*), is amended

Effective date: August 27, 1975. Because this amendment relieves a restriction, it is found, for good cause shown, that an immediate effective date is in the public interest.

(Secs. 103, 112, 114, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1401, 1403, 1407); delegation of authority at 49 CFR 1.51.)

Issued on August 22, 1975.

James B. Gregory
Administrator

40 F.R. 38159
August 27, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74**Brake Hoses****(Docket No. 1-5; Notice 18)**

This notice amends 49 CFR 571.106-74 (Standard No. 106-74, *Brake Hoses*) to permit, until August 31, 1976, the manufacturing of motor vehicles with brake hose, brake hose end fittings, and brake hose assemblies which comply with all requirements of the standard except certain labeling requirements.

In a notice published on June 28, 1974 (39 FR 24012, Docket No. 1-5, Notice 11), the following scheme of effective dates was established: September 1, 1974, for brake hose and brake hose end fittings; March 1, 1975, for brake hose assemblies; and September 1, 1975, for vehicles to which the standard applies. This scheme was designed to permit an orderly phase-in of parts meeting the new standard, by allowing six months at each production stage for the depletion of inventories of non-conforming parts.

After the September 1, 1974, effective date for hose and fittings, it became apparent that, due to a misunderstanding within the industry of the standard's requirements, stocks of hose and end fittings manufactured before that date would not be completely converted into assemblies by the March 1, 1975, effective date for assemblies. Because the only difference between those non-conforming components and hose and fittings manufactured after September 1, 1974, appeared to be one of labeling, the NHTSA added S12 to the standard. That section extended until August 31, 1975, the period during which such components could be used in assemblies, provided that they met all of the standard's performance requirements (30 FR 39725, Docket No. 1-5, Notice 14).

Since the publication of Notice 14, there has been an unforeseen sharp decline in the produc-

tion of new trucks, causing several component manufacturers, distributors, and vehicle manufacturers to have on hand large inventories of hose and end fittings manufactured before September 1, 1974, and of assemblies manufactured from them before March 1, 1975.

A further extension of the time during which these inventories could be exhausted was requested in petitions for rulemaking filed by Parker-Hannifin Corp., Wagner Electric Corp., Aeroquip Corp., Samuel Moore and Co., Freightliner Corp., and PACCAR, Inc. These petitioners indicated that, without such an extension, components valued at several hundred thousand dollars would have to be scrapped, even though they comply fully with all performance requirements of the standard. The petitioners requested extensions ranging from 6 to 18 months.

As with the inventories which were the subject of the Notice 14 amendment, safety of performance is not a major issue. The NHTSA has determined that, while granting these petitions may continue to make enforcement by this agency more difficult until these inventories are depleted, the avoidance of waste in this situation is appropriate and in the public interest. Accordingly, a 1-year extension is granted. It should be noted that this amendment makes no change in the banding requirement for assemblies manufactured on and after March 1, 1975. S13(c) is merely intended to facilitate the exhaustion of stocks of unbanded assemblies which comply with the standard in all other respects.

Because of the imminent effective date of a requirement which would otherwise lead to substantial economic waste, the NHTSA for good cause finds that notice and public procedure on

Effective: August 27, 1975

this amendment are impracticable and contrary to the public interest.

In consideration of the foregoing, 49 CFR 571.106-74 (Standard No. 106-74, *Brake hoses*), is amended

Effective date: August 27, 1975. Because this amendment relieves a restriction, it is found, for good cause shown, that an immediate effective date is in the public interest.

(Secs. 103, 112, 114, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1401, 1403, 1407); delegation of authority at 49 CFR 1.51.)

Issued on August 22, 1975.

James B. Gregory
Administrator

40 F.R. 38159
August 27, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74**Brake Hoses****(Docket No. 1-5; Notice 20)**

This notice delays until September 1, 1976, the effective date of the hose label masking requirements of 49 CFR 571.106-74 (Standard No. 106-74, *Brake Hoses*), in order to allow further time for evaluation of comments on the proposed amendment of the standard that would eliminate those requirements.

In its present form, S5.2.2 of the standard (by itself and as incorporated by reference in S7.2 and S9.1) requires at least one legend of labeling information to remain either visible after painting and undercoating, or properly masked, on each brake hose in a completed vehicle. As a practical matter, this provision requires masking. In Notice 17 (40 F.R. 32336, August 1, 1975), the requirement's effective date was set as March 1, 1976. In Notice 19 (40 F.R. 55365, November 28, 1975), elimination of the masking requirement and several other labeling requirements was proposed. The NHTSA has not concluded its evaluation of the comments that have been submitted in response to that proposal. In order to permit vehicle manufacturers to defer preparation for compliance with a requirement which

might never become effective, this notice delays the effective date of the masking requirement for 6 months.

In consideration of the foregoing, the effective date of the requirement in S5.2.2, S7.2, and S9.1 of 49 CFR 571.106-74 (Standard No. 106-74, *Brake Hoses*), that hose label information remain visible on completed vehicles unless properly masked, is changed to September 1, 1976. Because of the need for further evaluation of comments and the otherwise imminent effective date of this requirement, the NHTSA for good cause finds that notice and public procedure on this delay are impracticable and contrary to the public interest.

(Secs. 103, 112, 114, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1401, 1403, 1407); delegation of authority at 49 CFR 1.50.)

Issued on February 24, 1976.

James B. Gregory
Administrator

41 F.R. 8783
March 1, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74**Brake Hoses****(Docket No. 1-5; Notice 20)**

This notice delays until September 1, 1976, the effective date of the hose label masking requirements of 49 CFR 571.106-74 (Standard No. 106-74, *Brake Hoses*), in order to allow further time for evaluation of comments on the proposed amendment of the standard that would eliminate those requirements.

In its present form, S5.2.2 of the standard (by itself and as incorporated by reference in S7.2 and S9.1) requires at least one legend of labeling information to remain either visible after painting and undercoating, or properly masked, on each brake hose in a completed vehicle. As a practical matter, this provision requires masking. In Notice 17 (40 F.R. 32336, August 1, 1975), the requirement's effective date was set as March 1, 1976. In Notice 19 (40 F.R. 55365, November 28, 1975), elimination of the masking requirement and several other labeling requirements was proposed. The NHTSA has not concluded its evaluation of the comments that have been submitted in response to that proposal. In order to permit vehicle manufacturers to defer preparation for compliance with a requirement which

might never become effective, this notice delays the effective date of the masking requirement for 6 months.

In consideration of the foregoing, the effective date of the requirement in S5.2.2, S7.2, and S9.1 of 49 CFR 571.106-74 (Standard No. 106-74, *Brake Hoses*), that hose label information remain visible on completed vehicles unless properly masked, is changed to September 1, 1976. Because of the need for further evaluation of comments and the otherwise imminent effective date of this requirement, the NHTSA for good cause finds that notice and public procedure on this delay are impracticable and contrary to the public interest.

(Secs. 103, 112, 114, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1401, 1403, 1407); delegation of authority at 49 CFR 1.50.)

Issued on February 24, 1976.

James B. Gregory
Administrator

41 F.R. 8783
March 1, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74**Brake Hoses**

(Docket No. 1-5; Notice 21)

This notice amends the definitions and several labeling requirements of Standard No. 106-74, *Brake Hoses*. The definition of "brake hose assembly" is amended to exclude certain assemblies made in the field from all new components for repair service. A definition for "vacuum tubing connector" is added, and the definition of "brake hose" is amended to exclude such connectors. The requirement that certain information remain either visible or properly masked on brake hoses in completed vehicles—the "masking requirement"—is eliminated. In addition, the requirements that hose be labeled "permanently" and that a full legend of information appear on any hose, regardless of its length, are eliminated.

The amendment of the definition in Standard No. 106-74 (49 CFR 571.106-74) of "brake hose assembly" was proposed in Notice 15 (40 F.R. 8962; March 4, 1975). The remaining amendment were proposed in Notice 19 (40 F.R. 55365; November 28, 1975). Seventy-nine comments were received in response to the former proposal and 14 in response to the latter. Any suggestions for changes from the proposals not specifically mentioned herein are denied, on the basis of all the information presently available to this agency.

NOTICE 15

Standard No. 106-74 has required the manufacturer of a brake hose assembly, except a vehicle manufacturer who assembles and installs it in a vehicle manufactured by him, to affix a band to his product. The band must be labeled with the date of assembly, a designation identifying him as the assembler, and the symbol "DOT" as a certification that the assembly meets all applicable safety standards. Assemblies made entirely of new components for installation in used vehicles come from a variety of sources. Among these

are repair shops, employees of truck fleet owners, and even truck owners themselves. Under the applicable law, each of these many assemblers is a "manufacturer". The NHTSA has concluded that, as suggested in Notice 15, the burden of affixing a band and certifying compliance with the requirements of the standard is not commensurate with the relatively small number of assemblies prepared by such manufacturers. The exclusion of the assemblies in question from the definition will relieve them of both the banding and performance requirements of the standard. The Weatherhead Company, Wagner Electric Corporation, and the Brake System Parts Manufacturing Council pointed out that the proposed amendment of the definition would permit the preparation of replacement hydraulic assemblies in the field with renewable or useable end fittings, because such assemblies would no longer be subject to S5.1, which requires hydraulic end fittings to be attached by crimping or swaging. The NHTSA did not intend such a result. Accordingly, this notice limits the proposed exclusion from the definition of "brake hose assembly" to air and vacuum assemblies.

Paccar pointed out that the driver of a tractor-trailer combination is often the owner of the tractor but not the trailer, and that the proposed amendment would not exclude assemblies made in the field by such a driver for installation on the trailer that he is towing. For this reason, the amendment adopted today also excludes from the definition those assemblies prepared by the operator of a used vehicle for installation in that vehicle.

Several distributors of brake hose and brake hose assemblies urged that the proposed exclusion be extended to cover assemblies made by them as

well. In recognition of the costs of banding, the NHTSA has granted petitions for rulemaking to eliminate the banding requirement for all manufacturers of brake hose assemblies. A notice of proposed rulemaking on this subject can be expected in the near future. Such an amendment of the standard, if adopted, will relieve distributors of the expense of banding while retaining the performance and other requirements applicable to brake hose assemblies.

NOTICE 19

Masking. S5.2.2, S7.2, and S9.1 of the standard require certain information to be labeled on new hydraulic, air and vacuum brake hose, respectively. In addition, S5.2.2 in its present form (by itself and as incorporated by reference in S7.2 and S9.1) requires, effective September 1, 1976, at least one legend of that information to be visible on each brake hose that has been installed in a motor vehicle, unless it is covered by a manually removable masking material in such a way that no adhesive contacts any part of the legend. The practical effect of this section, unless amended, would be to require the addition of an entire new stage in the vehicle manufacturing process.

Elimination of the masking requirement was proposed in Notice 19. All comments in response to the notice supported this proposal. The NHTSA has concluded that, in light of the limited usefulness of the information that would be preserved, the masking requirement creates an inappropriate burden and should be eliminated.

Labeling of short hoses. The standard presently requires that, effective September 1, 1976, a complete legend of labeling information appear on every brake hose, regardless of its length. Because this would require manual labeling of hose shorter than the normal label spacing, Notice 19 proposed elimination of the "short hose labeling" requirement. No objections were received, and the requirement is eliminated accordingly. For clarification, the first sentence of S5.2.2 is modified to indicate that, for labeling purposes, hose need merely be cut from bulk hose that is properly labeled.

Permanent labeling. Also proposed in Notice 19 was the elimination of the requirement that

hoses be permanently labeled. Volkswagen objected to such elimination, arguing that "if the labeling provision has any meaning at all, the labeling must be permanent." Even without a performance requirement, however, the information specified in S5.2.2 must appear on bulk hose to identify it to distributors, dealers, assemblers, and installers, and to facilitate compliance inspection and testing. Because the agency conducts its compliance tests on new hose and assemblies, these purposes have been fulfilled once the hose is put in service. Accordingly, the permanence requirement is deleted from S5.2.2. If in the future the agency finds a need to ensure preservation of identifying information for the life of the hose, a requirement for permanence can be established through further rulemaking.

Vacuum tubing connectors. Bendix Corporation petitioned for an amendment of the standard that would exclude from its coverage certain short flexible connectors used in vacuum brake booster systems. These connectors, while meeting the existing definition of "brake hose," have special performance requirements that make it inappropriate to subject them to this standard. No comments objected to the proposal in Notice 19 to amend the definition of "brake hose." Wagner Electric, however, suggested that the exclusion of tubing connectors be limited to those used in vacuum systems. Such an approach provides the requested accommodation of an existing practice that has proved acceptable without encouraging the improper design of short air and hydraulic brake hoses. Accordingly, the definition of "brake hose" is amended to exclude vacuum tubing connectors. The latter are defined as proposed, with the modification suggested by Wagner Electric.

The National Motor Vehicle Safety Advisory Council took no position on the proposals of these amendments.

In consideration of the foregoing, 49 CFR 571.106-74 (Standard No. 106-74, *Brake Hoses*) is amended. . . .

Effective date: July 12, 1976. Because these amendments relieve restrictions and create no

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74

Brake Hoses

(Docket No. 1-5; Notice 21)

This notice amends the definitions and several labeling requirements of Standard No. 106-74, *Brake Hoses*. The definition of "brake hose assembly" is amended to exclude certain assemblies made in the field from all new components for repair service. A definition for "vacuum tubing connector" is added, and the definition of "brake hose" is amended to exclude such connectors. The requirement that certain information remain either visible or properly masked on brake hoses in completed vehicles—the "masking requirement"—is eliminated. In addition, the requirements that hose be labeled "permanently" and that a full legend of information appear on any hose, regardless of its length, are eliminated.

The amendment of the definition in Standard No. 106-74 (49 CFR 571.106-74) of "brake hose assembly" was proposed in Notice 15 (40 F.R. 8962; March 4, 1975). The remaining amendment were proposed in Notice 19 (40 F.R. 55365; November 28, 1975). Seventy-nine comments were received in response to the former proposal and 14 in response to the latter. Any suggestions for changes from the proposals not specifically mentioned herein are denied, on the basis of all the information presently available to this agency.

NOTICE 15

Standard No. 106-74 has required the manufacturer of a brake hose assembly, except a vehicle manufacturer who assembles and installs it in a vehicle manufactured by him, to affix a band to his product. The band must be labeled with the date of assembly, a designation identifying him as the assembler, and the symbol "DOT" as a certification that the assembly meets all applicable safety standards. Assemblies made entirely of new components for installation in used vehicles come from a variety of sources. Among these

are repair shops, employees of truck fleet owners, and even truck owners themselves. Under the applicable law, each of these many assemblers is a "manufacturer". The NHTSA has concluded that, as suggested in Notice 15, the burden of affixing a band and certifying compliance with the requirements of the standard is not commensurate with the relatively small number of assemblies prepared by such manufacturers. The exclusion of the assemblies in question from the definition will relieve them of both the banding and performance requirements of the standard. The Weatherhead Company, Wagner Electric Corporation, and the Brake System Parts Manufacturing Council pointed out that the proposed amendment of the definition would permit the preparation of replacement hydraulic assemblies in the field with renewable or useable end fittings, because such assemblies would no longer be subject to S5.1, which requires hydraulic end fittings to be attached by crimping or swaging. The NHTSA did not intend such a result. Accordingly, this notice limits the proposed exclusion from the definition of "brake hose assembly" to air and vacuum assemblies.

Paccar pointed out that the driver of a tractor-trailer combination is often the owner of the tractor but not the trailer, and that the proposed amendment would not exclude assemblies made in the field by such a driver for installation on the trailer that he is towing. For this reason, the amendment adopted today also excludes from the definition those assemblies prepared by the operator of a used vehicle for installation in that vehicle.

Several distributors of brake hose and brake hose assemblies urged that the proposed exclusion be extended to cover assemblies made by them as

well. In recognition of the costs of banding, the NHTSA has granted petitions for rulemaking to eliminate the banding requirement for all manufacturers of brake hose assemblies. A notice of proposed rulemaking on this subject can be expected in the near future. Such an amendment of the standard, if adopted, will relieve distributors of the expense of banding while retaining the performance and other requirements applicable to brake hose assemblies.

NOTICE 19

Masking. S5.2.2, S7.2, and S9.1 of the standard require certain information to be labeled on new hydraulic, air and vacuum brake hose, respectively. In addition, S5.2.2 in its present form (by itself and as incorporated by reference in S7.2 and S9.1) requires, effective September 1, 1976, at least one legend of that information to be visible on each brake hose that has been installed in a motor vehicle, unless it is covered by a manually removable masking material in such a way that no adhesive contacts any part of the legend. The practical effect of this section, unless amended, would be to require the addition of an entire new stage in the vehicle manufacturing process.

Elimination of the masking requirement was proposed in Notice 19. All comments in response to the notice supported this proposal. The NHTSA has concluded that, in light of the limited usefulness of the information that would be preserved, the masking requirement creates an inappropriate burden and should be eliminated.

Labeling of short hoses. The standard presently requires that, effective September 1, 1976, a complete legend of labeling information appear on every brake hose, regardless of its length. Because this would require manual labeling of hose shorter than the normal label spacing, Notice 19 proposed elimination of the "short hose labeling" requirement. No objections were received, and the requirement is eliminated accordingly. For clarification, the first sentence of S5.2.2 is modified to indicate that, for labeling purposes, hose need merely be cut from bulk hose that is properly labeled.

Permanent labeling. Also proposed in Notice 19 was the elimination of the requirement that

hoses be permanently labeled. Volkswagen objected to such elimination, arguing that "if the labeling provision has any meaning at all, the labeling must be permanent." Even without a performance requirement, however, the information specified in S5.2.2 must appear on bulk hose to identify it to distributors, dealers, assemblers, and installers, and to facilitate compliance inspection and testing. Because the agency conducts its compliance tests on new hose and assemblies, these purposes have been fulfilled once the hose is put in service. Accordingly, the permanence requirement is deleted from S5.2.2. If in the future the agency finds a need to ensure preservation of identifying information for the life of the hose, a requirement for permanence can be established through further rulemaking.

Vacuum tubing connectors. Bendix Corporation petitioned for an amendment of the standard that would exclude from its coverage certain short flexible connectors used in vacuum brake booster systems. These connectors, while meeting the existing definition of "brake hose," have special performance requirements that make it inappropriate to subject them to this standard. No comments objected to the proposal in Notice 19 to amend the definition of "brake hose." Wagner Electric, however, suggested that the exclusion of tubing connectors be limited to those used in vacuum systems. Such an approach provides the requested accommodation of an existing practice that has proved acceptable without encouraging the improper design of short air and hydraulic brake hoses. Accordingly, the definition of "brake hose" is amended to exclude vacuum tubing connectors. The latter are defined as proposed, with the modification suggested by Wagner Electric.

The National Motor Vehicle Safety Advisory Council took no position on the proposals of these amendments.

In consideration of the foregoing, 49 CFR 571.106-74 (Standard No. 106-74, *Brake Hoses*) is amended. . . .

Effective date: July 12, 1976. Because these amendments relieve restrictions and create no

Effective: July 12, 1976

additional burdens, the NHTSA finds, for good cause shown, that an immediate effective date is in the public interest.

(Secs. 103, 112, 114, 119, Pub. L. 89-563, 80 Stat 718 (15 U.S.C. 1392, 1401, 1403, 1407); delegation of authority at 49 CFR 1.50.)

Issued on July 7, 1976.

James B. Gregory
Administrator

41 F.R. 28505
July 12, 1976

Effective: July 12, 1976

additional burdens, the NHTSA finds, for good cause shown, that an immediate effective date is in the public interest.

(Secs. 103, 112, 114, 119, Pub. L. 89-563, 80 Stat 718 (15 U.S.C. 1392, 1401, 1403, 1407); delegation of authority at 49 CFR 1.50.)

Issued on July 7, 1976.

James B. Gregory
Administrator

41 F.R. 28505
July 12, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74**Brake Hoses****(Docket No. 1-5; Notice 22)**

This notice amends Standard No. 106-74, *Brake Hoses*, to permit the manufacturing of brake hose assemblies and motor vehicles with brake hose and brake hose end fittings which comply with all requirements of the standard except labeling requirements.

Standard No. 106-74 (49 CFR 571.106-74) was implemented with staggered effective dates for brake hose, assemblies, and motor vehicles. This scheme was designed to permit an orderly phase-in of parts meeting the new standard, by allowing six months at each production stage for the depletion of inventories of non-conforming parts.

Since implementation of the standard, there have been interruptions in the production of new trucks, causing several component manufacturers, distributors, and vehicle manufacturers to have on hand large inventories of hose and end fittings manufactured before September 1, 1974, and of assemblies manufactured from them before March 1, 1975. These components comply with all performance requirements of the standard, but not its labeling requirement.

A 1-year extension of the time during which these inventories could be exhausted by manufacture into assemblies and installations in motor vehicles was therefore granted (40 F.R. 38159, August 27, 1975). The NHTSA determined that, while granting the petitions could make enforcement by this agency more difficult until the inventories were depleted, the avoidance of waste in such a situation was appropriate and in the public interest.

The 1-year extension terminated August 31, 1976, and PACCAR Corporation has petitioned for a further extension of 90 days to permit exhausting inventories that it had planned to utilize earlier but has been unable to do. Freight-

liner Corporation petitioned for a similar 15-month extension, and Wagner Corporation suggested comparable delay for assemblies and vehicles. While the agency cannot make an extension "retroactive" to September 1, 1976, as PACCAR appeared to request, the NHTSA does conclude that the same balance of interests underlying the 1-year extension continue to be valid and justify use of the remaining unlabeled components. Because the agency has granted petitions to commence rulemaking to delete the assembly-labeling requirements that are mainly at issue here, it is concluded that the relaxation of the labeling requirements for assemblies and vehicles should be indefinite. As a practical matter, brake hose and fittings for use in motor vehicles are now only produced with the correct labeling.

Because of the agency's findings that substantial loss of safety benefit would not occur in this case and that substantial economic waste will occur if the brake hose components in question are not permitted to be used, the NHTSA for good cause finds that notice and public procedure on this amendment is contrary to the public interest.

In consideration of the foregoing, Standard No. 106-74 (49 CFR 571.106-74) is amended. . . .

Effective date: November 26, 1976. Because this amendment relieves a restriction, it is found, for good cause shown, that all immediate effective date is in the public interest.

(Secs. 103, 112, 114, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1401, 1403, 1407); delegation of authority at 49 CFR 1.50.)

Issued on November 18, 1976.

John W. Snow
Administrator

41 F.R. 52055
November 26, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74**Brake Hoses****(Docket No. 1-5; Notice 22)**

This notice amends Standard No. 106-74, *Brake Hoses*, to permit the manufacturing of brake hose assemblies and motor vehicles with brake hose and brake hose end fittings which comply with all requirements of the standard except labeling requirements.

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liner Corporation petitioned for a similar 15-month extension, and Wagner Corporation suggested comparable delay for assemblies and vehicles. While the agency cannot make an extension "retroactive" to September 1, 1976, as PACCAR appeared to request, the NHTSA does conclude that the same balance of interests underlying the 1-year extension continue to be valid and justify use of the remaining unlabeled components. Because the agency has granted petitions to commence rulemaking to delete the assembly-labeling requirements that are mainly at issue here, it is concluded that the relaxation of the labeling requirements for assemblies and vehicles should be indefinite. As a practical matter, brake hose and fittings for use in motor vehicles are now only produced with the correct labeling.

Because of the agency's findings that substantial loss of safety benefit would not occur in this case and that substantial economic waste will occur if the brake hose components in question are not permitted to be used, the NHTSA for good cause finds that notice and public procedure on this amendment is contrary to the public interest.

In consideration of the foregoing, Standard No. 106-74 (49 CFR 571.106-74) is amended. . . .

Effective date: November 26, 1976. Because this amendment relieves a restriction, it is found, for good cause shown, that all immediate effective date is in the public interest.

(Secs. 103, 112, 114, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1401, 1403, 1407); delegation of authority at 49 CFR 1.50.)

Issued on November 18, 1976.

John W. Snow
Administrator

41 F.R. 52055

November 26, 1976



PREAMBLE TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74

Brake Hoses

(Docket No 1-5; Notice 24)

This notice amends Standard No. 106-74, *Brake Hoses*, to exempt hydraulic brake hose to be used only in assemblies having keyed end fittings from the striping requirement, to exempt air and vacuum brake hose assemblies having renewable or reusable end fittings from the assembly labeling requirement, to exempt certain end fittings that are to be used on plastic vacuum brake hose from the end fitting labeling requirement, to provide for a stamping alternative to banding for the labeling of assemblies having crimped or swaged end fittings, to exempt coiled nylon air brake hose from the length change requirement for air brake hose, and to exempt wire reinforced air brake and vacuum brake hose from the adhesion requirements. This rule responds to industry requests for less expensive labeling alternatives and for relief from several performance requirements in the standard that are not appropriate for certain hose designs.

Dates: Effective date: May 25, 1978.

For further information contact:

Fred Redler, Crash Avoidance Division,
National Highway Traffic Safety Administration,
Washington, D.C. 20590 (202-426-0853).

Supplementary information: This amendment is based on a notice of proposed rulemaking published December 30, 1976 (41 F.R. 58365). Nineteen comments were received in response to that notice and were given full consideration in the formulation of this final rule. The comments were primarily supportive of the proposed changes.

Based on a petition by one committee of the American Society for Testing and Materials

(ASTM), the proposal specified an increase in the "brake fluid compatibility" test temperature from 200° to 212° F. The ASTM Committee petitioned for the increase so that the temperature would be compatible with the equivalent 100° Centigrade (C) value that has been proposed for adoption as a standard test temperature by the International Standards Organization. Several commenters strongly objected to this slight increase in the test temperature. Commenters stated that there is no safety justification for the proposed change and that the increase, over the 70-hour test period, could cause significant changes in test results and lead to the rejection of good hose. Four foreign commenters noted that the inner tubing of much imported brake hose is made from natural rubber rather than the synthetic materials that are generally used in the United States. They argued that this small temperature increase could rule out the use of natural rubber, which has certain desirable properties and which has otherwise proven satisfactory in the past.

General Motors stated that the International Standards Organization has apparently not proposed a temperature of 100° C for this test and that the test temperature for "brake fluid compatibility" should remain at 200° F. The ASTM Committee D-11.31 stated that the ASTM Committee that requested the change (D-11.45) was not authorized to seek the change, and the ruling ASTM Committee does not approve of the temperature increase.

Based on consideration of these comments, the NHTSA has concluded that an increase in temperature for "brake fluid compatibility" testing of brake hose is not justified. Therefore, the proposed change is not adopted.

This amendment exempts air and vacuum brake hose assemblies having renewable or reusable end fittings from the existing labeling requirement (banding) for brake hose assemblies (by specifying assembly labeling requirements only for brake hose assemblies having end fittings attached by crimping or swaging). Further, the new assembly labeling requirement provides for alternative methods of labeling by banding or by stamping (or etching or embossing) of one end fitting on the assembly. The new provisions do not require the date of assembly to be placed on the label, whether banding or stamping is used.

Paccar recommended retention of the existing requirement that the date of assembly be included in assembly labeling. Paccar contended that date of assembly is important for purposes of determining the shelf-life of an assembly. The NHTSA concludes that the assembly date is not necessary for this purpose, because it is the brake hose that generally determines the assembly shelf-life. Since the hose must bear its date of manufacture under existing requirements, this should suffice as an indicator of the entire assembly's shelf life.

Several commenters stated that the assembly labeling requirements should be deleted altogether, arguing that brake hose assembly failures are most likely to result from installation errors and damage in service rather than from improper production of the assembly. Samuel Moore and Company argued that all assembly labeling should be totally optional. While data demonstrate that most assembly failures result from improper installation or later damage, identity of the assembler is still important. If assembly labeling were not required, only reputable assemblers might identify themselves with their products. The door would be opened to the marketing of substandard hose assemblies, and there would be no way to identify the assembler in the event a safety-related defect or a noncompliance necessitated recall.

Samuel Moore and Company also stated that the proposed assembly labeling requirement would discriminate against manufacturers of crimped and swaged air brake hose assemblies, since the requirements would not be applicable to assemblies having renewable or reusable end

fittings. The agency did not require labeling for assemblies having renewable or reusable end fittings because it has been found that such labeling is impractical. With reusable end fittings the assembler's identity could be lost or misapplied by a person who reassembles the set at a later date, and the chances for confusion concerning who assembled the set would be great.

Paccar commented that the "stamping" option for assemblies having crimped or swaged end fittings could create confusion also, and that all assembly labeling requirements should be deleted. While the NHTSA agrees that some confusion might exist, labeling of assemblies having permanent end fittings is substantially more practicable and offers less possibility for confusion than labeling of assemblies having renewable or reusable end fittings. Most of the hypotheses posed by Paccar involved situations in which permanent end fittings are stamped with the fitting manufacturer's designation (which is not required by the standard). Paccar contends confusion as to who is responsible for the assembly could result when an assembler later applies his band to the assembly or when a repair shop in the field produces an assembly using stamped end fittings.

Since end fittings that are to be attached to hose by crimping or swaging are not required to be labeled, the NHTSA concludes that it is the responsibility of the fitting manufacturer who chooses to stamp his fittings to keep adequate records whether a certain production lot of fittings are sold by themselves or whether they are used in assemblies that are also produced by the fitting manufacturer.

Paccar also argued that large assemblers who also manufacture end fittings would have an economic advantage over assemblers whom they supply with end fittings, since end fittings are usually stamped with the fitting manufacturer's designation. With the stamping labeling alternative, the fitting manufacturer who also makes assemblies would not have to further label his assemblies, whereas an assembler who purchased his end fittings would have to pay either the cost of special labeling of end fittings or that of banding.

PREAMBLE TO MOTOR VEHICLE SAFETY STANDARD NO. 106-74

Brake Hoses

(Docket No 1-5; Notice 24)

This notice amends Standard No. 106-74, *Brake Hoses*, to exempt hydraulic brake hose to be used only in assemblies having keyed end fittings from the striping requirement, to exempt air and vacuum brake hose assemblies having renewable or reusable end fittings from the assembly labeling requirement, to exempt certain end fittings that are to be used on plastic vacuum brake hose from the end fitting labeling requirement, to provide for a stamping alternative to banding for the labeling of assemblies having crimped or swaged end fittings, to exempt coiled nylon air brake hose from the length change requirement for air brake hose, and to exempt wire reinforced air brake and vacuum brake hose from the adhesion requirements. This rule responds to industry requests for less expensive labeling alternatives and for relief from several performance requirements in the standard that are not appropriate for certain hose designs.

Dates: Effective date: May 25, 1978.

For further information contact:

Fred Redler, Crash Avoidance Division,
National Highway Traffic Safety Administration,
Washington, D.C. 20590 (202-426-0853).

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(ASTM), the proposal specified an increase in the "brake fluid compatibility" test temperature from 200° to 212° F. The ASTM Committee petitioned for the increase so that the temperature would be compatible with the equivalent 100° Centigrade (C) value that has been proposed for adoption as a standard test temperature by the International Standards Organization. Several commenters strongly objected to this slight increase in the test temperature. Commenters stated that there is no safety justification for the proposed change and that the increase, over the 70-hour test period, could cause significant changes in test results and lead to the rejection of good hose. Four foreign commenters noted that the inner tubing of much imported brake hose is made from natural rubber rather than the synthetic materials that are generally used in the United States. They argued that this small temperature increase could rule out the use of natural rubber, which has certain desirable properties and which has otherwise proven satisfactory in the past.

General Motors stated that the International Standards Organization has apparently not proposed a temperature of 100° C for this test and that the test temperature for "brake fluid compatibility" should remain at 200°F. The ASTM Committee D-11.31 stated that the ASTM Committee that requested the change (D-11.45) was not authorized to seek the change, and the ruling ASTM Committee does not approve of the temperature increase.

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This amendment exempts air and vacuum brake hose assemblies having renewable or reusable end fittings from the existing labeling requirement (banding) for brake hose assemblies (by specifying assembly labeling requirements only for brake hose assemblies having end fittings attached by crimping or swaging). Further, the new assembly labeling requirement provides for alternative methods of labeling by banding or by stamping (or etching or embossing) of one end fitting on the assembly. The new provisions do not require the date of assembly to be placed on the label, whether banding or stamping is used.

Paccar recommended retention of the existing requirement that the date of assembly be included in assembly labeling. Paccar contended that date of assembly is important for purposes of determining the shelf-life of an assembly. The NHTSA concludes that the assembly date is not necessary for this purpose, because it is the brake hose that generally determines the assembly shelf-life. Since the hose must bear its date of manufacture under existing requirements, this should suffice as an indicator of the entire assembly's shelf life.

Several commenters stated that the assembly labeling requirements should be deleted altogether, arguing that brake hose assembly failures are most likely to result from installation errors and damage in service rather than from improper production of the assembly. Samuel Moore and Company argued that all assembly labeling should be totally optional. While data demonstrate that most assembly failures result from improper installation or later damage, identity of the assembler is still important. If assembly labeling were not required, only reputable assemblers might identify themselves with their products. The door would be opened to the marketing of substandard hose assemblies, and there would be no way to identify the assembler in the event a safety-related defect or a noncompliance necessitated recall.

Samuel Moore and Company also stated that the proposed assembly labeling requirement would discriminate against manufacturers of crimped and swaged air brake hose assemblies, since the requirements would not be applicable to assemblies having renewable or reusable end

fittings. The agency did not require labeling for assemblies having renewable or reusable end fittings because it has been found that such labeling is impractical. With reusable end fittings the assembler's identity could be lost or misapplied by a person who reassembles the set at a later date, and the chances for confusion concerning who assembled the set would be great.

Paccar commented that the "stamping" option for assemblies having crimped or swaged end fittings could create confusion also, and that all assembly labeling requirements should be deleted. While the NHTSA agrees that some confusion might exist, labeling of assemblies having permanent end fittings is substantially more practicable and offers less possibility for confusion than labeling of assemblies having renewable or reusable end fittings. Most of the hypotheses posed by Paccar involved situations in which permanent end fittings are stamped with the fitting manufacturer's designation (which is not required by the standard). Paccar contends confusion as to who is responsible for the assembly could result when an assembler later applies his band to the assembly or when a repair shop in the field produces an assembly using stamped end fittings.

Since end fittings that are to be attached to hose by crimping or swaging are not required to be labeled, the NHTSA concludes that it is the responsibility of the fitting manufacturer who chooses to stamp his fittings to keep adequate records whether a certain production lot of fittings are sold by themselves or whether they are used in assemblies that are also produced by the fitting manufacturer.

Paccar also argued that large assemblers who also manufacture end fittings would have an economic advantage over assemblers whom they supply with end fittings, since end fittings are usually stamped with the fitting manufacturer's designation. With the stamping labeling alternative, the fitting manufacturer who also makes assemblies would not have to further label his assemblies, whereas an assembler who purchased his end fittings would have to pay either the cost of special labeling of end fittings or that of banding.

The NHTSA recognizes that there are several items of higher cost borne by small assemblers but disagrees that the assembly labeling requirements are discriminatory as suggested by Paccar. As mentioned earlier, manufacturers of permanent end fittings are not required to label their fittings (and if they do so they bear the additional cost by choice). Therefore, under the new assembly labeling requirements, assemblers who are also permanent end fitting manufacturers and small assemblers who do not manufacture end fittings are on the same footing; both are required to label only once, either by banding or by stamping the end fitting. Of course, independent of any standard, an assembler who produces all components of his product can generally manufacture an assembly at a lower cost than an assembler who purchases components for his product.

Further, from a practical standpoint, the larger assemblers who also supply end fittings to smaller assemblers are not generally in competition with the smaller assemblers. Rather, they deal with large volume users in competition with other large suppliers. The small assemblers are generally only in competition with other small assemblers who are in the same position with respect to cost of assembly labeling. The requirements are, therefore, made final as proposed.

Several commenters pointed out that the notice proposing these amendments deleted an existing exemption from the assembly labeling requirements of the standard. Assemblies that are assembled and installed by a vehicle manufacturer in vehicles manufactured by him are currently excepted from the requirements of paragraph S5.2.4. The deletion in the proposal was inadvertent, and the exception is included in the new paragraph S5.2.4 specified in this amendment.

General Motors noted that the proposed new paragraph S5.2.4.1 (the stamping option for assembly labeling) did not specify any criteria for the manufacturer's designation and asked whether the designation could consist of block capital letters or symbols representative of the assembler. General Motors also requested concurrence in their assumption that, as a manufacturer of both bulk brake hose and hose assemblies, they

would be permitted under the stamping option to use one designation for bulk hose and a different designation for hose assemblies. Finally General Motors recommended that the phrase "shall be permanently etched, embossed, or stamped," in proposed paragraph S5.2.4.1 and in existing paragraph S5.2.4 be changed to read, "shall be etched, embossed, or stamped by means of deformation of the material." They argued that the word "permanently" should be deleted, since any marking can eventually be obliterated by corrosion, rust, abuse, or other means.

The NHTSA agrees with the clarification and editorial changes requested by General Motors, and the changes are included in these amendments of the hose assembly and end fitting labeling requirements. The NHTSA concurs with General Motors' assumption that it is permitted to stamp its bulk hose and its assemblies with different designations. The word "permanently" is deleted from paragraphs S5.2.3 and S5.2.4, as it was from paragraph S5.2.2 in a previous notice (41 F.R. 28505, July 12, 1976).

International Harvester objected to the proposal to exempt hydraulic brake hose used in assemblies with keyed end fittings from the striping requirement of paragraph S5.2.1. International Harvester stated that its hose assemblies with keyed end fittings are designed with different orientations for the left and right hand sides of vehicles. Each could be installed with a 20° twist if inadvertently installed on the wrong side of the vehicle. Since the striping requirement is intended to prevent twisted installation, this amendment only exempts hose for use in an assembly whose end fittings prevent its installation in a twisted orientation.

Commenters supported the proposed exemption from labeling of end fittings used in factory-made, non-repairable plastic vacuum brake hose assemblies (such as those used by Mercedes-Benz). The proposal is therefore made final.

Commenters also agreed with the proposed exemption of coiled nylon air brake hose from the "length-change" requirement of paragraph S7.3.6. The requirement is therefore amended as proposed.

Effective: May 25, 1978

Paragraphs S7.3.7 and S9.2.9 are amended to exempt wire-reinforced brake hose from the adhesion requirements of the standard, since the adhesion test does not give sufficiently repeatable results in the case of wire-reinforced brake hose. A substitute test for this type hose is under consideration.

The Dairy Equipment Company stated that all assembly labeling requirements were eliminated by a notice published November 26, 1977 (41 F.R. 52055) which revised paragraphs S12 and S13 of the standard. The Company's interpretation of that amendment is incorrect. As explained in the preamble to that notice, the revision of paragraphs S12 and S13 permits the indefinite use in new vehicles of hose assemblies manufactured prior to the effective date of the labeling requirement for assemblies.

This does not mean that new hose end fittings and assemblies produced after specific effective dates do not have to meet the labeling requirements of the standard. For example, a hose assembly manufactured today must bear the required assembly labeling even if it is constructed of hose or end fittings that do not have DOT labeling because they were manufactured prior to September 1, 1974.

Since this amendment relieves restrictions, the agency has determined that it will have negligible economic impact. The environmental effects of the amendments should be positive. Elimination of the banding requirement will save approximately 30,000 pounds of material annually.

The engineer and lawyer primarily responsible for the development of this rulemaking document are Fred Redler and Hugh Oates, respectively.

Because these amendments relieve restrictions and create no additional burdens, the National Highway Traffic Safety Administration (NHTSA) finds, for good cause shown, that an immediate effective date is in the public interest.

In consideration of the foregoing, Standard No. 106-74 (49 CFR 571.106-74) is amended

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50.)

Issued on May 17, 1978.

Howard J. Dugoff
Acting Administrator
43 F.R. 22360-22362
May 25, 1978

The NHTSA recognizes that there are several items of higher cost borne by small assemblers but disagrees that the assembly labeling requirements are discriminatory as suggested by Paccar. As mentioned earlier, manufacturers of permanent end fittings are not required to label their fittings (and if they do so they bear the additional cost by choice). Therefore, under the new assembly labeling requirements, assemblers who are also permanent end fitting manufacturers and small assemblers who do not manufacture end fittings are on the same footing; both are required to label only once, either by banding or by stamping the end fitting. Of course, independent of any standard, an assembler who produces all components of his product can generally manufacture an assembly at a lower cost than an assembler who purchases components for his product.

Further, from a practical standpoint, the larger assemblers who also supply end fittings to smaller assemblers are not generally in competition with the smaller assemblers. Rather, they deal with large volume users in competition with other large suppliers. The small assemblers are generally only in competition with other small assemblers who are in the same position with respect to cost of assembly labeling. The requirements are, therefore, made final as proposed.

Several commenters pointed out that the notice proposing these amendments deleted an existing exemption from the assembly labeling requirements of the standard. Assemblies that are assembled and installed by a vehicle manufacturer in vehicles manufactured by him are currently excepted from the requirements of paragraph S5.2.4. The deletion in the proposal was inadvertent, and the exception is included in the new paragraph S5.2.4 specified in this amendment.

General Motors noted that the proposed new paragraph S5.2.4.1 (the stamping option for assembly labeling) did not specify any criteria for the manufacturer's designation and asked whether the designation could consist of block capital letters or symbols representative of the assembler. General Motors also requested concurrence in their assumption that, as a manufacturer of both bulk brake hose and hose assemblies, they

would be permitted under the stamping option to use one designation for bulk hose and a different designation for hose assemblies. Finally General Motors recommended that the phrase "shall be permanently etched, embossed, or stamped," in proposed paragraph S5.2.4.1 and in existing paragraph S5.2.4 be changed to read, "shall be etched, embossed, or stamped by means of deformation of the material." They argued that the word "permanently" should be deleted, since any marking can eventually be obliterated by corrosion, rust, abuse, or other means.

The NHTSA agrees with the clarification and editorial changes requested by General Motors, and the changes are included in these amendments of the hose assembly and end fitting labeling requirements. The NHTSA concurs with General Motors' assumption that it is permitted to stamp its bulk hose and its assemblies with different designations. The word "permanently" is deleted from paragraphs S5.2.3 and S5.2.4, as it was from paragraph S5.2.2 in a previous notice (41 F.R. 28505, July 12, 1976).

International Harvester objected to the proposal to exempt hydraulic brake hose used in assemblies with keyed end fittings from the striping requirement of paragraph S5.2.1. International Harvester stated that its hose assemblies with keyed end fittings are designed with different orientations for the left and right hand sides of vehicles. Each could be installed with a 20° twist if inadvertently installed on the wrong side of the vehicle. Since the striping requirement is intended to prevent twisted installation, this amendment only exempts hose for use in an assembly whose end fittings prevent its installation in a twisted orientation.

Commenters supported the proposed exemption from labeling of end fittings used in factory-made, non-repairable plastic vacuum brake hose assemblies (such as those used by Mercedes-Benz). The proposal is therefore made final.

Commenters also agreed with the proposed exemption of coiled nylon air brake hose from the "length-change" requirement of paragraph S7.3.6. The requirement is therefore amended as proposed.

Paragraphs S7.3.7 and S9.2.9 are amended to exempt wire-reinforced brake hose from the adhesion requirements of the standard, since the adhesion test does not give sufficiently repeatable results in the case of wire-reinforced brake hose. A substitute test for this type hose is under consideration.

The Dairy Equipment Company stated that all assembly labeling requirements were eliminated by a notice published November 26, 1977 (41 F.R. 52055) which revised paragraphs S12 and S13 of the standard. The Company's interpretation of that amendment is incorrect. As explained in the preamble to that notice, the revision of paragraphs S12 and S13 permits the indefinite use in new vehicles of hose assemblies manufactured prior to the effective date of the labeling requirement for assemblies.

This does not mean that new hose end fittings and assemblies produced after specific effective dates do not have to meet the labeling requirements of the standard. For example, a hose assembly manufactured today must bear the required assembly labeling even if it is constructed of hose or end fittings that do not have DOT labeling because they were manufactured prior to September 1, 1974.

Since this amendment relieves restrictions, the agency has determined that it will have negligible economic impact. The environmental effects of the amendments should be positive. Elimination of the banding requirement will save approximately 30,000 pounds of material annually.

The engineer and lawyer primarily responsible for the development of this rulemaking document are Fred Redler and Hugh Oates, respectively.

Because these amendments relieve restrictions and create no additional burdens, the National Highway Traffic Safety Administration (NHTSA) finds, for good cause shown, that an immediate effective date is in the public interest.

In consideration of the foregoing, Standard No. 106-74 (49 CFR 571.106-74) is amended . . .

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50.)

Issued on May 17, 1978.

Howard J. Dugoff
Acting Administrator
43 F.R. 22360-22362
May 25, 1978

PREAMBLE TO AN AMENDMENT TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 106

Federal Motor Vehicle Safety Standards; Brake Hoses

[Docket No. 81-18; Notice 2]

ACTION: Final rule.

SUMMARY: The purpose of this notice is to amend Safety Standard No. 106, *Brake Hoses*, to make a change in the test procedures relating to the brake hose "whip test." Specifically, the list of items to be removed from the brake hose assembly prior to conducting the "whip test" is expanded to include mounting brackets. The amendment is responsive to a petition for rulemaking submitted by General Motors Corporation, and makes the test procedures specified in the standard consistent with the test procedures used by the agency's Office of Enforcement.

EFFECTIVE DATE: October 22, 1982.

SUPPLEMENTARY INFORMATION: Safety Standard No. 106, *Brake Hoses* (49 CFR 571.106), specifies a "whip test" for hose assemblies to measure fatigue resistance. On March 29, 1982, the agency issued a notice of proposed rulemaking to amend the procedure for that test, in response to a petition for rulemaking submitted by General Motors Corporation (47 F.R. 13176). General Motors asked for certain changes because of possible confusion between the NHTSA's Laboratory Procedures and the procedures stated in the standard with respect to preparing brake hose assemblies for the "whip test."

The Laboratory Procedure for conducting the "whip test" published by the NHTSA Office of Standards Enforcement in 1975 ("Laboratory Procedure for Brake Hose Testing" TP-106-03)

specifies the following procedure in preparation of the Whip Fatigue Test: "All external appendages such as chafing collars, mounting brackets, date bands and spring guards shall be removed from the brake hose assembly prior to testing on the whip machine." By contrast, paragraph S6.3.2(a) of Safety Standard No. 106 specifies the following preparation: "Remove hose armor and date band, if any." As noted in the March proposal, General Motors was concerned that this inconsistency might create confusion, and requested that the standard be amended to include all the items that are specified for removal in the Laboratory Procedure. The notice of proposed rulemaking sought to remove the inconsistency.

There were five comments to the proposal from the following vehicle manufacturers: Chrysler, Ford, American Motors, Volkswagen and General Motors. All supported the proposed change and stated that it should have absolutely no adverse effect on the integrity of the whip fatigue test.

The agency has determined that this minor technical change should be adopted as proposed. The agency has always intended for all external appendages to be removed prior to conducting the "whip test." As noted in the proposal, since it is only the brake hose itself that is being tested for fatigue resistance, it is not necessary to have readily removable external components present during the test. Further, these external components could unnecessarily complicate the test procedure or cause problems by becoming caught in the test apparatus. The agency does not believe that removing these components will in any way degrade the safety performance that is

garnered from the "whip test." Therefore, the standard is being amended as proposed.

Issued on October 5, 1982.

Raymond A. Peck, Jr.
Administrator
47 F.R. 47838
October 28, 1982

PREAMBLE TO AN AMENDMENT TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 106

Federal Motor Vehicle Safety Standards; Brake Hoses

[Docket No. 81-18; Notice 2]

ACTION: Final rule.

SUMMARY: The purpose of this notice is to amend Safety Standard No. 106, *Brake Hoses*, to make a change in the test procedures relating to the brake hose "whip test." Specifically, the list of items to be removed from the brake hose assembly prior to conducting the "whip test" is expanded to include mounting brackets. The amendment is responsive to a petition for rulemaking submitted by General Motors Corporation, and makes the test procedures specified in the standard consistent with the test procedures used by the agency's Office of Enforcement.

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The Laboratory Procedure for conducting the "whip test" published by the NHTSA Office of Standards Enforcement in 1975 ("Laboratory Procedure for Brake Hose Testing" TP-106-03)

specifies the following procedure in preparation of the Whip Fatigue Test: "All external appendages such as chafing collars, mounting brackets, date bands and spring guards shall be removed from the brake hose assembly prior to testing on the whip machine." By contrast, paragraph S6.3.2(a) of Safety Standard No. 106 specifies the following preparation: "Remove hose armor and date band, if any." As noted in the March proposal, General Motors was concerned that this inconsistency might create confusion, and requested that the standard be amended to include all the items that are specified for removal in the Laboratory Procedure. The notice of proposed rulemaking sought to remove the inconsistency.

There were five comments to the proposal from the following vehicle manufacturers: Chrysler, Ford, American Motors, Volkswagen and General Motors. All supported the proposed change and stated that it should have absolutely no adverse effect on the integrity of the whip fatigue test.

The agency has determined that this minor technical change should be adopted as proposed. The agency has always intended for all external appendages to be removed prior to conducting the "whip test." As noted in the proposal, since it is only the brake hose itself that is being tested for fatigue resistance, it is not necessary to have readily removable external components present during the test. Further, these external components could unnecessarily complicate the test procedure or cause problems by becoming caught in the test apparatus. The agency does not believe that removing these components will in any way degrade the safety performance that is

garnered from the "whip test." Therefore, the standard is being amended as proposed.

Issued on October 5, 1982.

Raymond A. Peck, Jr.
Administrator
47 F.R. 47838
October 28, 1982

MOTOR VEHICLE SAFETY STANDARD NO. 106

Brake Hoses

S1. Scope. This standard specifies labeling and performance requirements for motor vehicle brake hose, brake hose assemblies, and brake hose end fittings.

S2. Purpose. The purpose of this standard is to reduce deaths and injuries occurring as a result of brake system failure from pressure or vacuum loss due to hose or hose assembly rupture.

S3. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, buses, trailers, and motorcycles, and to hydraulic, air, and vacuum brake hose, brake hose assemblies, and brake hose end fittings for use in those vehicles.

S4. Definitions.

“Armor” means protective material installed on a brake hose to increase the resistance of the hose or hose assembly to abrasion or impact damage.

“Brake hose” means a flexible conduit, other than a vacuum tubing connector, manufactured for use in a brake system to transmit or contain the fluid pressure or vacuum used to apply force to a vehicle’s brakes.

“Brake hose assembly” means a brake hose, with or without armor, equipped with end fittings for use in a brake system, but does not include an air or vacuum assembly prepared by the owner or operator of a used vehicle, by his employee, or by a repair facility, for installation in that used vehicle.

“Brake hose end fitting” means a coupler, other than a clamp, designed for attachment to the end of a brake hose.

“Free length” means the linear measurement of hose exposed between the end fittings of a hose assembly in a straight position.

“Permanently attached end fitting” means an end fitting that is attached by deformation of the fitting about the hose by crimping or swaging, or an end fitting that is attached by use of a sacrificial sleeve or ferrule that requires replacement each time a hose assembly is rebuilt.

“Rupture” means any failure that results in separation of a brake hose from its end fitting or in leakage.

“Vacuum tubing connector” means a flexible conduit of vacuum that (i) connects metal tubing to metal tubing in a brake system, (ii) is attached without end fittings, and (iii) when installed, has an unsupported length less than the total length of those portions that cover the metal tubing.

For hose, a dimensional description such as “1/4-inch hose” refers to the nominal inside diameter. For tubing, a dimensional description such as “1/4-inch tubing” refers to the nominal outside diameter.

S5. Requirements—Hydraulic brake hose, brake hose assemblies, and brake hose end fittings.

S5.1 Construction. Each hydraulic brake hose assembly shall have permanently attached brake hose end fittings which are attached by deformation of the fitting about the hose by crimping or swaging.

S5.2 Labeling.

S5.2.1 Each hydraulic brake hose shall have at least two clearly identifiable stripes of at least one-sixteenth of an inch in width, placed on opposite sides of the brake hose parallel to

its longitudinal axis. One stripe may be interrupted by the information required by S5.2.2, and the other stripe may be interrupted by additional information at the manufacturer's option. However, hydraulic brake hose manufactured for use only in an assembly whose end fittings prevent its installation in a twisted orientation in either side of the vehicle, need not meet the requirements of S5.2.1.

S5.2.2 Each hydraulic brake hose shall be labeled, or cut from bulk hose that is labeled, at intervals of not more than 6 inches, measured from the end of one legend to the beginning of the next, in block capital letters and numerals at least one-eighth of an inch high, with the information listed in paragraphs (a) through (e). The information need not be present on hose after it has become part of a brake hose assembly or after it has been installed in a motor vehicle.

(a) The symbol DOT, constituting a certification by the hose manufacturer that the hose conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of the hose, which shall be filed in writing with: Office of Crash Avoidance, Handling and Stability Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The marking may consist of a designation other than block capital letters required by S5.2.2.

(c) The month, day, and year, or the month and year, of manufacture, expressed in numerals. For example, 10/1/74 means October 1, 1974.

(d) The nominal inside diameter of the hose expressed in inches or fractions of inches.

(e) Either "HR" to indicate that the hose is regular expansion hydraulic hose or "HL" to indicate that the hose is low expansion hydraulic hose.

S5.2.3 "Reserved"

S5.2.4 Each hydraulic brake hose assembly, except those assembled and installed by a vehicle manufacturer in vehicles manufactured by him, shall be labeled by means of a band around the brake hose assembly as specified in this paragraph or, at the option of the manufacturer, by means of

labeling as specified in S5.2.4.1. The band may at the manufacturer's option be attached so as to move freely along the length of the assembly, as long as it is retained by the end fittings. The band shall be etched, embossed, or stamped in block capitals letters, numerals, or symbols at least one-eighth of an inch high with the following information:

(a) The symbol DOT constituting certification by the hose assembler that the hose assembly conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of the hose assembly, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

S5.2.4.1 At least one end fitting of a hydraulic brake hose assembly shall be etched, stamped, or embossed with a designation at least one-sixteenth of an inch high that identifies the manufacturing of the hose assembly and is filed in accordance with S5.2.4(b).

S5.3 Test requirements. A hydraulic brake hose assembly or appropriate part thereof shall be capable of meeting any of the requirements set forth under this heading, when tested under the conditions of S11 and the applicable procedures of S6. However, a particular hose assembly or appropriate part thereof need not meet further requirements after having been subjected to and having met the constriction requirement (S5.3.1) and any one of the requirements specified in S5.3.2 through S5.3.11.

S5.3.1 Constriction. Except for that part of an end fitting which does not contain hose, every inside diameter of any section of a hydraulic brake hose assembly shall be not less than 64 percent of the nominal inside diameter of the brake hose.

S5.3.2 Expansion and burst strength. The maximum expansion of a hydraulic brake hose assembly at 1,000 psi and 1,500 psi shall not exceed the values specified in Table I (S6.1).

MOTOR VEHICLE SAFETY STANDARD NO. 106

Brake Hoses

S1. Scope. This standard specifies labeling and performance requirements for motor vehicle brake hose, brake hose assemblies, and brake hose end fittings.

S2. Purpose. The purpose of this standard is to reduce deaths and injuries occurring as a result of brake system failure from pressure or vacuum loss due to hose or hose assembly rupture.

S3. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, buses, trailers, and motorcycles, and to hydraulic, air, and vacuum brake hose, brake hose assemblies, and brake hose end fittings for use in those vehicles.

S4. Definitions.

“Armor” means protective material installed on a brake hose to increase the resistance of the hose or hose assembly to abrasion or impact damage.

“Brake hose” means a flexible conduit, other than a vacuum tubing connector, manufactured for use in a brake system to transmit or contain the fluid pressure or vacuum used to apply force to a vehicle’s brakes.

“Brake hose assembly” means a brake hose, with or without armor, equipped with end fittings for use in a brake system, but does not include an air or vacuum assembly prepared by the owner or operator of a used vehicle, by his employee, or by a repair facility, for installation in that used vehicle.

“Brake hose end fitting” means a coupler, other than a clamp, designed for attachment to the end of a brake hose.

“Free length” means the linear measurement of hose exposed between the end fittings of a hose assembly in a straight position.

“Permanently attached end fitting” means an end fitting that is attached by deformation of the fitting about the hose by crimping or swaging, or an end fitting that is attached by use of a sacrificial sleeve or ferrule that requires replacement each time a hose assembly is rebuilt.

“Rupture” means any failure that results in separation of a brake hose from its end fitting or in leakage.

“Vacuum tubing connector” means a flexible conduit of vacuum that (i) connects metal tubing to metal tubing in a brake system, (ii) is attached without end fittings, and (iii) when installed, has an unsupported length less than the total length of those portions that cover the metal tubing.

For hose, a dimensional description such as “¼-inch hose” refers to the nominal inside diameter. For tubing, a dimensional description such as “¼-inch tubing” refers to the nominal outside diameter.

S5. Requirements—Hydraulic brake hose, brake hose assemblies, and brake hose end fittings.

S5.1 Construction. Each hydraulic brake hose assembly shall have permanently attached brake hose end fittings which are attached by deformation of the fitting about the hose by crimping or swaging.

S5.2 Labeling.

S5.2.1 Each hydraulic brake hose shall have at least two clearly identifiable stripes of at least one-sixteenth of an inch in width, placed on opposite sides of the brake hose parallel to

its longitudinal axis. One stripe may be interrupted by the information required by S5.2.2, and the other stripe may be interrupted by additional information at the manufacturer's option. However, hydraulic brake hose manufactured for use only in an assembly whose end fittings prevent its installation in a twisted orientation in either side of the vehicle, need not meet the requirements of S5.2.1.

S5.2.2 Each hydraulic brake hose shall be labeled, or cut from bulk hose that is labeled, at intervals of not more than 6 inches, measured from the end of one legend to the beginning of the next, in block capital letters and numerals at least one-eighth of an inch high, with the information listed in paragraphs (a) through (e). The information need not be present on hose after it has become part of a brake hose assembly or after it has been installed in a motor vehicle.

(a) The symbol DOT, constituting a certification by the hose manufacturer that the hose conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of the hose, which shall be filed in writing with: Office of Crash Avoidance, Handling and Stability Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The marking may consist of a designation other than block capital letters required by S5.2.2.

(c) The month, day, and year, or the month and year, of manufacture, expressed in numerals. For example, 10/1/74 means October 1, 1974.

(d) The nominal inside diameter of the hose expressed in inches or fractions of inches.

(e) Either "HR" to indicate that the hose is regular expansion hydraulic hose or "HL" to indicate that the hose is low expansion hydraulic hose.

S5.2.3 "Reserved"

S5.2.4 Each hydraulic brake hose assembly, except those assembled and installed by a vehicle manufacturer in vehicles manufactured by him, shall be labeled by means of a band around the brake hose assembly as specified in this paragraph or, at the option of the manufacturer, by means of

labeling as specified in S5.2.4.1. The band may at the manufacturer's option be attached so as to move freely along the length of the assembly, as long as it is retained by the end fittings. The band shall be etched, embossed, or stamped in block capitals letters, numerals, or symbols at least one-eighth of an inch high with the following information:

(a) The symbol DOT constituting certification by the hose assembler that the hose assembly conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of the hose assembly, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

S5.2.4.1 At least one end fitting of a hydraulic brake hose assembly shall be etched, stamped, or embossed with a designation at least one-sixteenth of an inch high that identifies the manufacturing of the hose assembly and is filed in accordance with S5.2.4(b).

S5.3 Test requirements. A hydraulic brake hose assembly or appropriate part thereof shall be capable of meeting any of the requirements set forth under this heading, when tested under the conditions of S11 and the applicable procedures of S6. However, a particular hose assembly or appropriate part thereof need not meet further requirements after having been subjected to and having met the constriction requirement (S5.3.1) and any one of the requirements specified in S5.3.2 through S5.3.11.

S5.3.1 Constriction. Except for that part of an end fitting which does not contain hose, every inside diameter of any section of a hydraulic brake hose assembly shall be not less than 64 percent of the nominal inside diameter of the brake hose.

S5.3.2 Expansion and burst strength. The maximum expansion of a hydraulic brake hose assembly at 1,000 psi and 1,500 psi shall not exceed the values specified in Table I (S6.1).

The hydraulic brake hose assembly shall then withstand water pressure of 4,000 psi for 2 minutes without rupture, and shall not rupture at less than 5,000 psi (S6.2).

S5.3.3 Whip resistance. A hydraulic brake hose assembly shall not rupture when run continuously on a flexing machine for 35 hours (S6.3).

S5.3.4 Tensile strength. A hydraulic brake hose assembly shall withstand a pull of 325 pounds without separation of the hose from its end fittings (S6.4).

S5.3.5 Water absorption and burst strength. A hydraulic brake hose assembly, after immersion in water for 70 hours (S6.5), shall withstand water pressure of 4,000 psi for 2 minutes, and then shall not rupture at less than 5,000 psi (S6.2).

S5.3.6 Water absorption and tensile strength. A hydraulic brake hose assembly, after immersion in water for 70 hours (S6.5), shall withstand a pull of 325 pounds without separation of the hose from its end fittings (S6.4).

S5.3.7 Water absorption and whip resistance. A hydraulic brake hose assembly, after immersion in water for 70 hours (S6.5), shall not rupture when run continuously on a flexing machine for 35 hours (S6.3).

S5.3.8 Low-temperature resistance. A hydraulic brake hose conditioned at minus 40°F for 70 hours shall not show cracks visible without magnification when bent around a cylinder as specified in S6.6 (S6.6).

S5.3.9 Brake fluid compatibility, constriction, and burst strength. Except for brake hose assemblies designed for use with mineral or petroleum-based brake fluids, a hydraulic brake hose assembly shall meet the constriction requirement of S5.3.1 after having been subjected to a temperature of 200°F for 70 hours while filled with SAE RM-1 compatibility brake fluid (S6.7). It shall then withstand water pressure of 4,000 psi for 2 minutes and thereafter shall not rupture at less than 5,000 psi (S6.2).

5.3.10 Ozone resistance. A hydraulic brake hose shall not show cracks visible under 7-power magnification after exposure to ozone for 70 hours at 140°F (S6.8).

S5.3.11 End fitting corrosion resistance. After 24 hours of exposure to salt spray, a hydraulic brake hose end fitting shall show no base metal corrosion on the end fitting surface except where crimping or the application of labeling information has caused displacement of the protective coating (S6.9).

TABLE 1—Maximum Expansion of Free Length Brake Hose, cc/ft.

| Hydraulic Brake Hose, inside diameter | Test Pressure | | | |
|--|------------------------------|--------------------------|------------------------------|--------------------------|
| | 1,000 psi | | 1,500 psi | |
| | Regular Expansion Hose | Low Expansion Hose | Regular Expansion Hose | Low Expansion Hose |
| 1/8 inch or less | 0.66 | 0.33 | 0.79 | 0.42 |
| 3/16 inch | 0.86 | 0.55 | 1.02 | 0.72 |
| 1/4 inch or more | 1.04 | 0.82 | 1.30 | 1.17 |

S6. Test procedures—Hydraulic brake hose, brake hose assemblies, and brake hose end fittings.

S6.1 Expansion test.

S6.1.1 Apparatus. Utilize a test apparatus (as shown in Figure 1) which consists of:

- (a) Source for required fluid pressure;
- (b) Test fluid of water without any additives and free of gases.
- (c) Reservoir for test fluid;
- (d) Pressure gauges;
- (e) Brake hose end fittings in which to mount the hose vertically; and
- (f) Graduated burette with 0.05 cc increments.

S6.1.2 Preparation.

- (a) Measure the free length of the hose assembly.
- (b) Mount the hose so that it is in a vertical straight position without tension when pressure is applied.
- (c) Fill the hose with test fluid and bleed all gases from the system.
- (d) Close the valve to the burette and apply 1,500 psi for 10 seconds; then release pressure.

S6.1.3 Calculation of expansion at 1,000 and 1,500 psi.

- (a) Adjust the fluid level in the burette to zero.
- (b) Close the valve to the burette, apply pressure at the rate of 15,000 psi per minute, and seal 1,000 psi in the hose (1,500 psi in second series).
- (c) After 3 seconds open the valve to the burette for 10 seconds and allow the fluid in the expanded hose to rise into the burette.
- (d) Repeat the procedure in steps (b) and (c) twice. Measure the amount of test fluid which has accumulated in the burette as a result of the three applications of pressure.
- (e) Calculate the volumetric expansion per foot by dividing the total accumulated test fluid by 3 and further dividing by the free length of the hose in feet.

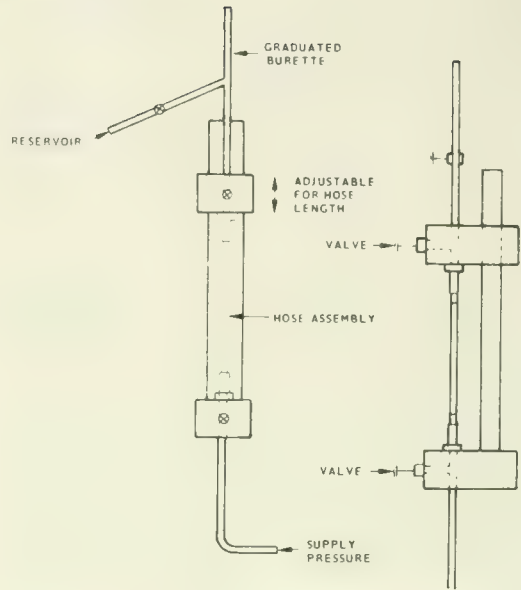


Fig. 1-Expansion Test Apparatus

S6.2 Burst strength test.

- (a) Connect the brake hose to a pressure system and fill it completely with water, allowing all gases to escape.
- (b) Apply water pressure of 4,000 psi at a rate of 15,000 psi per minute.
- (c) After 2 minutes at 4,000 psi, increase the pressure at the rate of 15,000 psi per minute until the pressure exceeds 5,000 psi.

S6.3 Whip resistance test.

S6.3.1 Apparatus. Utilize test apparatus that is dynamically balanced and includes:

- (a) A movable header consisting of a horizontal bar equipped with capped end fittings and mounted through bearings at each end to points 4 inches from the center of two vertically rotating disks whose edges are in the same vertical plane;
- (b) An adjustable stationary header parallel to the movable header in the same horizontal plane as the centers of the disks, and fitted with open end fittings;
- (c) An elapsed time indicator; and
- (d) A source of water pressure connected to the open end fittings.

The hydraulic brake hose assembly shall then withstand water pressure of 4,000 psi for 2 minutes without rupture, and shall not rupture at less than 5,000 psi (S6.2).

S5.3.3 Whip resistance. A hydraulic brake hose assembly shall not rupture when run continuously on a flexing machine for 35 hours (S6.3).

S5.3.4 Tensile strength. A hydraulic brake hose assembly shall withstand a pull of 325 pounds without separation of the hose from its end fittings (S6.4).

S5.3.5 Water absorption and burst strength. A hydraulic brake hose assembly, after immersion in water for 70 hours (S6.5), shall withstand water pressure of 4,000 psi for 2 minutes, and then shall not rupture at less than 5,000 psi (S6.2).

S5.3.6 Water absorption and tensile strength. A hydraulic brake hose assembly, after immersion in water for 70 hours (S6.5), shall withstand a pull of 325 pounds without separation of the hose from its end fittings (S6.4).

S5.3.7 Water absorption and whip resistance. A hydraulic brake hose assembly, after immersion in water for 70 hours (S6.5), shall not rupture when run continuously on a flexing machine for 35 hours (S6.3).

S5.3.8 Low-temperature resistance. A hydraulic brake hose conditioned at minus 40°F for 70 hours shall not show cracks visible without magnification when bent around a cylinder as specified in S6.6 (S6.6)

S5.3.9 Brake fluid compatibility, constriction, and burst strength. Except for brake hose assemblies designed for use with mineral or petroleum-based brake fluids, a hydraulic brake hose assembly shall meet the constriction requirement of S5.3.1 after having been subjected to a temperature of 200°F for 70 hours while filled with SAE RM-1 compatibility brake fluid (S6.7). It shall then withstand water pressure of 4,000 psi for 2 minutes and thereafter shall not rupture at less than 5,000 psi (S6.2).

5.3.10 Ozone resistance. A hydraulic brake hose shall not show cracks visible under 7-power magnification after exposure to ozone for 70 hours at 140°F (S6.8).

S5.3.11 End fitting corrosion resistance. After 24 hours of exposure to salt spray, a hydraulic brake hose end fitting shall show no base metal corrosion on the end fitting surface except where crimping or the application of labeling information has caused displacement of the protective coating (S6.9).

TABLE 1—Maximum Expansion of Free Length Brake Hose, cc/ft.

| Hydraulic Brake Hose, inside diameter | Test Pressure | | | |
|--|------------------------------|--------------------------|------------------------------|--------------------------|
| | 1,000 psi | | 1,500 psi | |
| | Regular Expansion Hose | Low Expansion Hose | Regular Expansion Hose | Low Expansion Hose |
| 1/8 inch or less | 0.66 | 0.33 | 0.79 | 0.42 |
| 3/16 inch | 0.86 | 0.55 | 1.02 | 0.72 |
| 1/4 inch or more | 1.04 | 0.82 | 1.30 | 1.17 |

S6. Test procedures—Hydraulic brake hose, brake hose assemblies, and brake hose end fittings.

S6.1 Expansion test.

S6.1.1 Apparatus. Utilize a test apparatus (as shown in Figure 1) which consists of:

- (a) Source for required fluid pressure;
- (b) Test fluid of water without any additives and free of gases.
- (c) Reservoir for test fluid;
- (d) Pressure gauges;
- (e) Brake hose end fittings in which to mount the hose vertically; and
- (f) Graduated burette with 0.05 cc increments.

S6.1.2 Preparation.

- (a) Measure the free length of the hose assembly.
- (b) Mount the hose so that it is in a vertical straight position without tension when pressure is applied.
- (c) Fill the hose with test fluid and bleed all gases from the system.
- (d) Close the valve to the burette and apply 1,500 psi for 10 seconds; then release pressure.

S6.1.3 Calculation of expansion at 1,000 and 1,500 psi.

- (a) Adjust the fluid level in the burette to zero.
- (b) Close the valve to the burette, apply pressure at the rate of 15,000 psi per minute, and seal 1,000 psi in the hose (1,500 psi in second series).
- (c) After 3 seconds open the valve to the burette for 10 seconds and allow the fluid in the expanded hose to rise into the burette.
- (d) Repeat the procedure in steps (b) and (c) twice. Measure the amount of test fluid which has accumulated in the burette as a result of the three applications of pressure.
- (e) Calculate the volumetric expansion per foot by dividing the total accumulated test fluid by 3 and further dividing by the free length of the hose in feet.

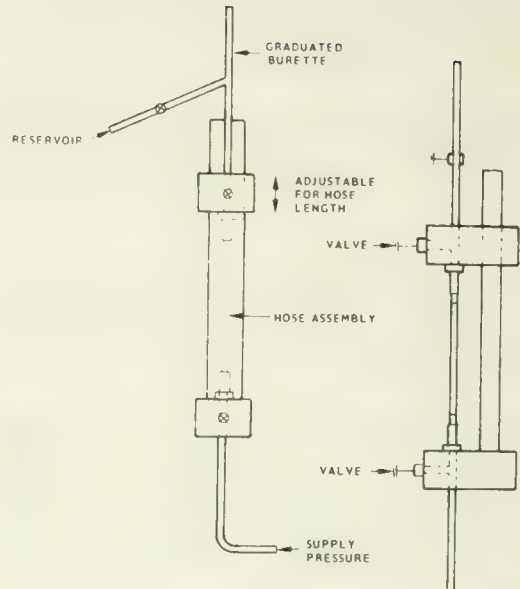


Fig. 1-Expansion Test Apparatus

S6.2 Burst strength test.

- (a) Connect the brake hose to a pressure system and fill it completely with water, allowing all gases to escape.
- (b) Apply water pressure of 4,000 psi at a rate of 15,000 psi per minute.
- (c) After 2 minutes at 4,000 psi, increase the pressure at the rate of 15,000 psi per minute until the pressure exceeds 5,000 psi.

S6.3 Whip resistance test.

S6.3.1 Apparatus. Utilize test apparatus that is dynamically balanced and includes:

- (a) A movable header consisting of a horizontal bar equipped with capped end fittings and mounted through bearings at each end to points 4 inches from the center of two vertically rotating disks whose edges are in the same vertical plane;
- (b) An adjustable stationary header parallel to the movable header in the same horizontal plane as the centers of the disks, and fitted with open end fittings;
- (c) An elapsed time indicator; and
- (d) A source of water pressure connected to the open end fittings.

S6.3.2 Preparation.

(a) [Remove all external appendages including, but not limited to, hose armor, chafing collars, mounting brackets, date bands and spring guards. (47 F.R. 47838. Effective: October 22, 1982)]

(b) Measure the hose free length.

(c) Mount the hose in the whip test machine introducing slack as specified in Table II for the size hose tested, measuring the projected length parallel to the axis of the rotating disks. The manufacturer may, at his option, adapt the fitting attachment points to permit mounting hose assemblies equipped with angled or other special fittings in the same orientation as hose assemblies equipped with straight fittings.

S6.3.3 Operation.

- (a) Apply 235 psi water pressure and bleed all gases from the system.
- (b) Drive the movable head at 800 rpm.

S6.4 Tensile strength test. Utilize a tension testing machine conforming to the requirements of the methods of Verification of Testing Machines (1964 American Society for Testing and Materials, Designation E4), and provided with a recording device to give the total pull in pounds.

S6.4.1 Preparation. Mount the hose assembly to ensure straight, evenly distributed machine pull.

S6.4.2 Operation. Apply tension at a rate of 1 inch per minute travel of the moving head until separation occurs.

S6.5 Water absorption sequence tests.

S6.5.1 Preparation. Prepare three hose assemblies as follows:

- (a) Remove 1 1/8 inches of hose cover, if any, from the center of the hose assemblies without

injury to any reinforcing material or elongation of the hose assemblies.

- (b) Measure the free length of the hose assemblies.

S6.5.2 Immersion and sequence testing.

- (a) Immerse the hose assemblies in distilled water for 70 hours.
- (b) Thirty minutes after removal from water, conduct tests S6.2, S6.3, and S6.4, using a different hose for each sequence.

S6.6 Low temperature resistance test.

S6.6.1 Preparation.

- (a) Remove hose armor, if any, and condition a hose in a straight position in air at minus 40°F for 70 hours.
- (b) Condition a cylinder in air at minus 40°F for 70 hours, using a cylinder of 2 1/2 inches in diameter for tests of hose less than 1/8-inch, 3 inches for tests of 1/8-inch hose, 3 1/2 inches for tests of 3/16-inch and 1/4-inch hose, and 4 inches for tests of hose greater than 1/4-inch in diameter.

S6.6.2 Flexibility testing. Bend the conditioned hose 180 degrees around the conditioned cylinder at a steady rate in a period of 3 to 5 seconds. Examine without magnification for cracks.

S6.7 Brake fluid compatibility test.

S6.7.1 Preparation.

- (a) Attach a hose assembly below a 1-pint reservoir filled with 100 ml of SAE RM-1 compatibility fluid as shown in Figure 2.

TABLE II—Hose Lengths

| Free length between end fittings, inches | Slack, inches | |
|--|-----------------------|-------------------------|
| | 1/8-inch hose or less | more than 1/8-inch hose |
| 8 to 15 1/2, inclusive | 1.750 | ----- |
| 10 to 15 1/2, inclusive | ----- | 1.000 |
| Over 15 1/2 to 19 inclusive | 1.250 | ----- |
| Over 19 to 24, inclusive | 0.750 | ----- |

(b) Fill the hose assembly with brake fluid, seal the lower end, and place the test assembly in an oven in a vertical position.

6.7.2 Oven treatment.

(a) Condition the hose assembly at 200° F for 70 hours.

(b) Cool the hose assembly at room temperature for 30 minutes.

(c) Drain the brake hose assembly, immediately determine that every inside diameter of any section of the hose assembly, except for that part of an end fitting which does not contain hose, is not less than 64 percent of the nominal inside diameter of the hose, and conduct the test specified in S6.2.

S6.8 Ozone resistance test. Utilize a cylinder with a diameter eight times the nominal outside diameter of the brake hose excluding armor.

S6.8.1 Preparation. After removing any armor, bind a hydraulic brake hose 360° around the cylinder. In the case of hose shorter than the circumference of the cylinder, bend the hose so that as much of its length as possible is in contact.

S6.8.2 Exposure to ozone.

(a) Condition the hose on the cylinder in air at room temperature for 24 hours.

(b) Immediately thereafter, condition the hose on the cylinder for 70 hours in an exposure chamber having an ambient air temperature of 104° F during the test and containing air mixed with ozone in the proportion of 50 parts of ozone per 100 million parts of air by volume.

(c) Examine the hose for cracks under 7-power magnification, ignoring areas immediately adjacent to or within the area covered by binding.

S6.9 End fitting corrosion resistance test. Utilize the apparatus described in ASTM B117-64, "Salt Spray (Fog) Testing."

S6.9.1 Construction. Construct the salt spray chamber so that:

(a) The construction material does not affect the corrosiveness of the fog;

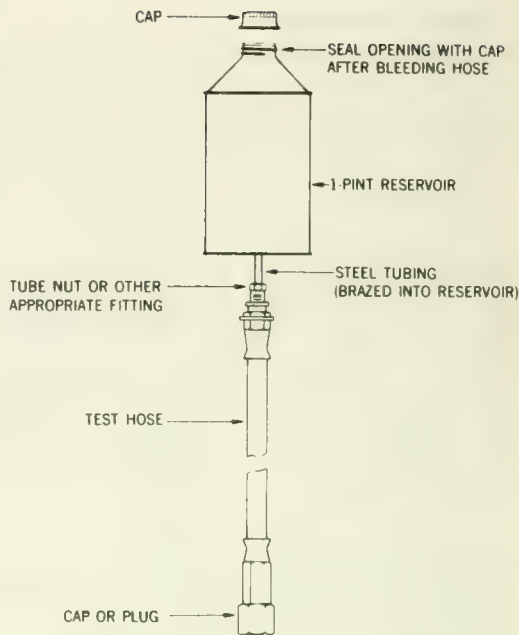


Fig 2-Brake Fluid Compatibility Apparatus

(b) The hose assembly is supported or suspended 30° from the vertical and parallel to the principal direction of the horizontal flow of fog through the chamber;

(c) The hose assembly does not contact any metallic material or any material capable of acting as a wick;

(d) Condensation which falls from the assembly does not return to the solution reservoir for respraying;

(e) Condensation from any source does not fall on the brake hose assemblies or the solution collectors; and

(f) Spray from the nozzles is not directed onto the hose assembly.

S6.9.2 Preparation.

(a) Plug each end of the hose assembly.

(b) Mix a salt solution five parts by weight of sodium chloride to 95 parts of distilled water, using sodium chloride substantially free of nickel and copper, and containing on a dry basis not more than 0.1 percent of sodium iodide and not more than 0.3 percent total impurities. Ensure that the solution is free of suspended solids before the solution is atomized.

(c) After atomization at 95° F ensure that the collected solution is in the pH range of 6.5 to 7.2. Make the pH measurements at 77° F.

S6.3.2 Preparation.

(a) [Remove all external appendages including, but not limited to, hose armor, chafing collars, mounting brackets, date bands and spring guards. (47 F.R. 47838. Effective: October 22, 1982)]

(b) Measure the hose free length.

(c) Mount the hose in the whip test machine introducing slack as specified in Table II for the size hose tested, measuring the projected length parallel to the axis of the rotating disks. The manufacturer may, at his option, adapt the fitting attachment points to permit mounting hose assemblies equipped with angled or other special fittings in the same orientation as hose assemblies equipped with straight fittings.

S6.3.3 Operation.

(a) Apply 235 psi water pressure and bleed all gases from the system.

(b) Drive the movable head at 800 rpm.

S6.4 Tensile strength test. Utilize a tension testing machine conforming to the requirements of the methods of Verification of Testing Machines (1964 American Society for Testing and Materials, Designation E4), and provided with a recording device to give the total pull in pounds.

S6.4.1 Preparation. Mount the hose assembly to ensure straight, evenly distributed machine pull.

S6.4.2 Operation. Apply tension at a rate of 1 inch per minute travel of the moving head until separation occurs.

S6.5 Water absorption sequence tests.

S6.5.1 Preparation. Prepare three hose assemblies as follows:

(a) Remove $1\frac{1}{8}$ inches of hose cover, if any, from the center of the hose assemblies without

injury to any reinforcing material or elongation of the hose assemblies.

(b) Measure the free length of the hose assemblies.

S6.5.2 Immersion and sequence testing.

(a) Immerse the hose assemblies in distilled water for 70 hours.

(b) Thirty minutes after removal from water, conduct tests S6.2, S6.3, and S6.4, using a different hose for each sequence.

S6.6 Low temperature resistance test.

S6.6.1 Preparation.

(a) Remove hose armor, if any, and condition a hose in a straight position in air at minus 40°F for 70 hours.

(b) Condition a cylinder in air at minus 40°F for 70 hours, using a cylinder of $2\frac{1}{2}$ inches in diameter for tests of hose less than $\frac{1}{8}$ -inch, 3 inches for tests of $\frac{1}{8}$ -inch hose, $3\frac{1}{2}$ inches for tests of $\frac{3}{16}$ -inch and $\frac{1}{4}$ -inch hose, and 4 inches for tests of hose greater than $\frac{1}{4}$ -inch in diameter.

S6.6.2 Flexibility testing. Bend the conditioned hose 180 degrees around the conditioned cylinder at a steady rate in a period of 3 to 5 seconds. Examine without magnification for cracks.

S6.7 Brake fluid compatibility test.

S6.7.1 Preparation.

(a) Attach a hose assembly below a 1-pint reservoir filled with 100 ml of SAE RM-1 compatibility fluid as shown in Figure 2.

TABLE II—Hose Lengths

| Free length between end fittings, inches | Slack, inches | |
|--|----------------------------------|------------------------------------|
| | $\frac{1}{8}$ -inch hose or less | more than $\frac{1}{8}$ -inch hose |
| 8 to $15\frac{1}{2}$, inclusive | 1.750 | ----- |
| 10 to $15\frac{1}{2}$, inclusive | ----- | 1.000 |
| Over $15\frac{1}{2}$ to 19 inclusive | 1.250 | ----- |
| Over 19 to 24, inclusive | 0.750 | ----- |

(b) Fill the hose assembly with brake fluid, seal the lower end, and place the test assembly in an oven in a vertical position.

6.7.2 Oven treatment.

(a) Condition the hose assembly at 200° F for 70 hours.

(b) Cool the hose assembly at room temperature for 30 minutes.

(c) Drain the brake hose assembly, immediately determine that every inside diameter of any section of the hose assembly, except for that part of an end fitting which does not contain hose, is not less than 64 percent of the nominal inside diameter of the hose, and conduct the test specified in S6.2.

S6.8 Ozone resistance test. Utilize a cylinder with a diameter eight times the nominal outside diameter of the brake hose excluding armor.

S6.8.1 Preparation. After removing any armor, bind a hydraulic brake hose 360° around the cylinder. In the case of hose shorter than the circumference of the cylinder, bend the hose so that as much of its length as possible is in contact.

S6.8.2 Exposure to ozone.

(a) Condition the hose on the cylinder in air at room temperature for 24 hours.

(b) Immediately thereafter, condition the hose on the cylinder for 70 hours in an exposure chamber having an ambient air temperature of 104° F during the test and containing air mixed with ozone in the proportion of 50 parts of ozone per 100 million parts of air by volume.

(c) Examine the hose for cracks under 7-power magnification, ignoring areas immediately adjacent to or within the area covered by binding.

S6.9 End fitting corrosion resistance test. Utilize the apparatus described in ASTM B117-64, "Salt Spray (Fog) Testing."

S6.9.1 Construction. Construct the salt spray chamber so that:

(a) The construction material does not affect the corrosiveness of the fog;

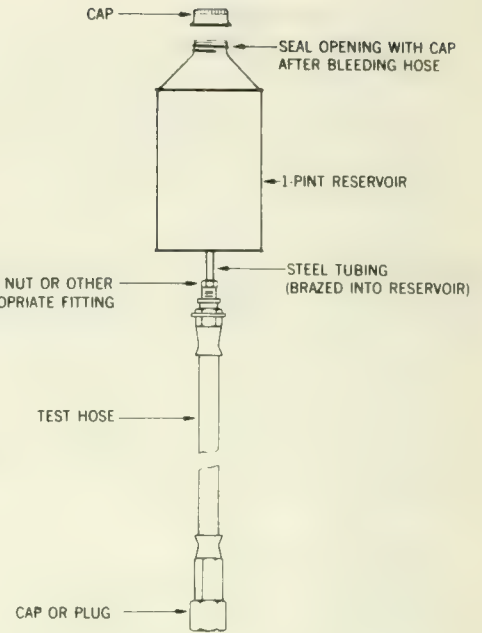


Fig. 2 Brake Fluid Compatibility Apparatus

(b) The hose assembly is supported or suspended 30° from the vertical and parallel to the principal direction of the horizontal flow of fog through the chamber;

(c) The hose assembly does not contact any metallic material or any material capable of acting as a wick;

(d) Condensation which falls from the assembly does not return to the solution reservoir for respraying;

(e) Condensation from any source does not fall on the brake hose assemblies or the solution collectors; and

(f) Spray from the nozzles is not directed onto the hose assembly.

S6.9.2 Preparation.

(a) Plug each end of the hose assembly.

(b) Mix a salt solution five parts by weight of sodium chloride to 95 parts of distilled water, using sodium chloride substantially free of nickel and copper, and containing on a dry basis not more than 0.1 percent of sodium iodide and not more than 0.3 percent total impurities. Ensure that the solution is free of suspended solids before the solution is atomized.

(c) After atomization at 95° F ensure that the collected solution is in the pH range of 6.5 to 7.2. Make the pH measurements at 77° F.

(d) Maintain a compressed air supply to the nozzle or nozzles free of oil and dirt and between 10 to 25 psi.

S6.9.3 Operation. Subject the brake hose assembly to the salt spray continuously for 24 hours.

(a) Regulate the mixture so that each collector will collect from 1 to 2 ml of solution per hour for each 80 square centimeters of horizontal collecting area.

(b) Maintain exposure zone temperature at 95° F.

(c) Upon completion, remove the salt deposit from the surface of the hoses by washing gently or dipping in clean running water not warmer than 100° F and then drying immediately.

S7. Requirements—Air brake hose, brake hose assemblies, and brake hose end fittings.

S7.1 Construction. Each air brake hose assembly shall be equipped with permanently attached brake hose end fittings or reusable brake hose end fittings. Each air brake hose intended for use with reusable end fittings shall conform to the dimensional requirements specified in Table III.

7.2.1 Hose. Each air brake hose shall be labeled, or cut from bulk hose that is labeled, at intervals of not more than 6 inches, measured

from the end of one legend to the beginning of the next, in block capital letters and numerals at least one-eighth of an inch high, with the information listed in paragraphs (a) through (e). The information need not be present on hose after it has become part of a brake hose assembly or after it has been installed in a motor vehicle.

(a) The symbol DOT, constituting a certification by the hose manufacturer that the hose conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of the hose, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

(c) The month, day, and year, or the month and year, of manufacture, expressed in numerals. For example, 10/1/74 means October 1, 1974.

(d) The nominal inside diameter of the hose expressed in inches or fractions of inches, or the nominal outside diameter of plastic tubing expressed in inches or fractions of inches followed by the letters OD. (Examples of inside diameter: 1/8, 1/2 (1/2 SP in the case of 1/2-inch special air brake hose). Example of outside diameter: 1/4 OD.)

TABLE III—Air Brake Hose Dimensions for Reusable Assemblies

| Size, inches | Inside Diameter Tolerance, inches | TYPE I | | TYPE II | |
|-----------------|--------------------------------------|---------------------|---------------------|---------------------|---------------------|
| | | O.D., inches Min | O.D., inches Max | O.D., inches Min | O.D., inches Max |
| 3/16 | +0.026 -0.000 | 0.472 | 0.510 | 0.500 | 0.539 |
| 1/4 | +0.031 -0.000 | 0.535 | 0.573 | 0.562 | 0.602 |
| 5/16 | +0.031 -0.000 | 0.598 | 0.636 | 0.656 | 0.695 |
| 3/8 | ±0.023 | 0.719 | 0.781 | 0.719 | 0.781 |
| 1 3/32 | +0.031 -0.000 | 0.714 | 0.760 | 0.742 | 0.789 |
| 1/2 | +0.039 -0.000 | 0.808 | 0.854 | 0.898 | 0.945 |
| 5/8 | +0.042 -0.000 | 0.933 | 0.979 | 1.054 | 1.101 |
| 1/2 special | ±0.031 | 0.844 | 0.906 | 0.844 | 0.906 |

(e)) The letter "A" shall indicate intended use in air brake systems. In the case of a hose intended for use in a reusable assembly, "AI" or "AII" shall indicate Type I or Type II dimensional characteristics of the hose as described in Table III.

S7.2.2 End fittings. Except for an end fitting that is attached by deformation of the fitting about a hose by crimping or swaging, at least one component of each air brake hose fittings shall be etched, embossed, or stamped in block capital letters and numerals at least one-sixteenth of an inch high with the following information:

(a) The symbol DOT, constituting a certification by the manufacturer of that component that the component conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of that component of the fitting, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

(c) The letter "A" shall indicate intended use in air brake systems. In the case of an end fitting intended for use in a reusable assembly, "AI" or "AII" shall indicate use with Type I or Type II hose, respectively.

(d) The nominal inside diameter of the hose to which the fitting is properly attached expressed in inches or fractions of inches, or the outside diameter of the plastic tubing to which the fitting is properly attached expressed in inches or fractions of inches, followed by the letters OD (See examples in S7.2.1(d)).

S7.2.3 Assemblies. Each air brake hose assembly made with end fittings that are attached by crimping or swaging, except those assembled and installed by a vehicle manufacturer in vehicles manufactured by him, shall be labeled by means of a band around the brake hose assembly as specified in this paragraph or, at the option of the manufacturer, by means of labeling as specified in S7.2.3.1. The band may at the manufacturer's option be attached so as to move freely along the length of the assembly, as long as it is retained by the end fittings. The band shall

be etched, embossed, or stamped in block capital letters, numerals, or symbols at least one-eighth of an inch high, with the following information:

(a) The symbol DOT, constituting certification by the hose assembler that the hose assembly conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of the hose assembly, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

S7.2.3.1 At least one end fitting of an air brake hose assembly made with end fittings that are attached by crimping or swaging shall be etched, stamped, or embossed with a designation at least one-sixteenth of an inch high that identifies the manufacturer of the hose assembly and is filed in accordance with S7.2.3(b).

S7.3 Test requirements. Each air brake hose assembly or appropriate part thereof shall be capable of meeting any of the requirements set forth under this heading, when tested under the conditions of S11 and the applicable procedures of S8. However, a particular hose assembly or appropriate part thereof need not meet further requirements after having met the constriction requirement (S7.3.1) and then having been subjected to any one of the requirements specified in S7.3.2 through S7.3.13.

S7.3.1 Constriction. Except for that part of an end fitting which does not contain hose, every inside diameter of any section of an air brake hose assembly shall be not less than 66 percent of the nominal inside diameter of the brake hose.

S7.3.2 High temperature resistance. An air brake hose shall not show external or internal cracks, charring, or disintegration visible without magnification when straightened after being bent for 70 hours at 212° F over a cylinder having the radius specified in Table IV for the size of hose tested (S8.1).

(d) Maintain a compressed air supply to the nozzle or nozzles free of oil and dirt and between 10 to 25 psi.

S6.9.3 Operation. Subject the brake hose assembly to the salt spray continuously for 24 hours.

(a) Regulate the mixture so that each collector will collect from 1 to 2 ml of solution per hour for each 80 square centimeters of horizontal collecting area.

(b) Maintain exposure zone temperature at 95° F.

(c) Upon completion, remove the salt deposit from the surface of the hoses by washing gently or dipping in clean running water not warmer than 100° F and then drying immediately.

S7. Requirements—Air brake hose, brake hose assemblies, and brake hose end fittings.

S7.1 Construction. Each air brake hose assembly shall be equipped with permanently attached brake hose end fittings or reusable brake hose end fittings. Each air brake hose intended for use with reusable end fittings shall conform to the dimensional requirements specified in Table III.

7.2.1 Hose. Each air brake hose shall be labeled, or cut from bulk hose that is labeled, at intervals of not more than 6 inches, measured

from the end of one legend to the beginning of the next, in block capital letters and numerals at least one-eighth of an inch high, with the information listed in paragraphs (a) through (e). The information need not be present on hose after it has become part of a brake hose assembly or after it has been installed in a motor vehicle.

(a) The symbol DOT, constituting a certification by the hose manufacturer that the hose conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of the hose, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

(c) The month, day, and year, or the month and year, of manufacture, expressed in numerals. For example, 10/1/74 means October 1, 1974.

(d) The nominal inside diameter of the hose expressed in inches or fractions of inches, or the nominal outside diameter of plastic tubing expressed in inches or fractions of inches followed by the letters OD. (Examples of inside diameter: $\frac{1}{8}$, $\frac{1}{2}$ ($\frac{1}{2}$ SP in the case of $\frac{1}{2}$ -inch special air brake hose). Example of outside diameter: $\frac{1}{4}$ OD.)

TABLE III—Air Brake Hose Dimensions for Reusable Assemblies

| Size, inches | Inside Diameter Tolerance, inches | TYPE I O.D., inches | | TYPE II O.D., inches | |
|-----------------------|--------------------------------------|------------------------|-------|-------------------------|-------|
| | | Min | Max | Min | Max |
| $\frac{3}{16}$ | +0.026 -0.000 | 0.472 | 0.510 | 0.500 | 0.539 |
| $\frac{1}{4}$ | +0.031 -0.000 | 0.535 | 0.573 | 0.562 | 0.602 |
| $\frac{5}{16}$ | +0.031 -0.000 | 0.598 | 0.636 | 0.656 | 0.695 |
| $\frac{3}{8}$ | ± 0.023 | 0.719 | 0.781 | 0.719 | 0.781 |
| $1\frac{3}{16}$ | +0.031 -0.000 | 0.714 | 0.760 | 0.742 | 0.789 |
| $\frac{1}{2}$ | +0.039 -0.000 | 0.808 | 0.854 | 0.898 | 0.945 |
| $\frac{5}{8}$ | +0.042 -0.000 | 0.933 | 0.979 | 1.054 | 1.101 |
| $\frac{1}{2}$ special | ± 0.031 | 0.844 | 0.906 | 0.844 | 0.906 |

(e)) The letter "A" shall indicate intended use in air brake systems. In the case of a hose intended for use in a reusable assembly, "AI" or "AII" shall indicate Type I or Type II dimensional characteristics of the hose as described in Table III.

S7.2.2 End fittings. Except for an end fitting that is attached by deformation of the fitting about a hose by crimping or swaging, at least one component of each air brake hose fittings shall be etched, embossed, or stamped in block capital letters and numerals at least one-sixteenth of an inch high with the following information:

(a) The symbol DOT, constituting a certification by the manufacturer of that component that the component conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of that component of the fitting, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

(c) The letter "A" shall indicate intended use in air brake systems. In the case of an end fitting intended for use in a reusable assembly, "AI" or "AII" shall indicate use with Type I or Type II hose, respectively.

(d) The nominal inside diameter of the hose to which the fitting is properly attached expressed in inches or fractions of inches, or the outside diameter of the plastic tubing to which the fitting is properly attached expressed in inches or fractions of inches, followed by the letters OD (See examples in S7.2.1(d)).

S7.2.3 Assemblies. Each air brake hose assembly made with end fittings that are attached by crimping or swaging, except those assembled and installed by a vehicle manufacturer in vehicles manufactured by him, shall be labeled by means of a band around the brake hose assembly as specified in this paragraph or, at the option of the manufacturer, by means of labeling as specified in S7.2.3.1. The band may at the manufacturer's option be attached so as to move freely along the length of the assembly, as long as it is retained by the end fittings. The band shall

be etched, embossed, or stamped in block capital letters, numerals, or symbols at least one-eighth of an inch high, with the following information:

(a) The symbol DOT, constituting certification by the hose assembler that the hose assembly conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of the hose assembly, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

S7.2.3.1 At least one end fitting of an air brake hose assembly made with end fittings that are attached by crimping or swaging shall be etched, stamped, or embossed with a designation at least one-sixteenth of an inch high that identifies the manufacturer of the hose assembly and is filed in accordance with S7.2.3(b).

S7.3 Test requirements. Each air brake hose assembly or appropriate part thereof shall be capable of meeting any of the requirements set forth under this heading, when tested under the conditions of S11 and the applicable procedures of S8. However, a particular hose assembly or appropriate part thereof need not meet further requirements after having met the constriction requirement (S7.3.1) and then having been subjected to any one of the requirements specified in S7.3.2 through S7.3.13.

S7.3.1 Constriction. Except for that part of an end fitting which does not contain hose, every inside diameter of any section of an air brake hose assembly shall be not less than 66 percent of the nominal inside diameter of the brake hose.

S7.3.2 High temperature resistance. An air brake hose shall not show external or internal cracks, charring, or disintegration visible without magnification when straightened after being bent for 70 hours at 212° F over a cylinder having the radius specified in Table IV for the size of hose tested (S8.1).

S7.3.3 Low temperature resistance. The outer cover of an air brake hose shall not show cracks visible without magnification as a result of conditioning at minus 40° F for 70 hours when bent around a cylinder having the radius specified in Table IV for the size of hose tested (S8.2).

S7.3.4 Oil resistance. After immersion in ASTM No. 3 oil for 70 hours at 212° F the volume of a specimen prepared from the inner tube and cover of an air brake hose shall not increase more than 100 percent (S8.3).

S7.3.5 Ozone resistance. The outer cover of an air brake hose shall not show cracks visible under 7-power magnification after exposure to ozone for 70 hours at 104° F (S8.4).

S7.3.6 Length change. An airbrake hose shall not contract in length more than 7 percent nor elongate more than 5 percent when subjected to air pressure of 200 psi (S8.5). “(other than a coiled nylon tube for use in an assembly that meets the requirements of § 393.45 of this title)” followed the phrase “An air brake hose.”

§ 7.3.7 Adhesion. “Except for hose reinforced by wire,” an airbrake hose shall withstand a tensile force of 8 pounds per inch of length before separation of adjacent layers (S8.6).

S7.3.8 Air pressure. An air brake hose assembly shall contain air pressure of 200 psi for 5 minutes without loss of more than 5 psi (S8.7).

S7.3.9 Burst strength. An air brake hose assembly shall not rupture when exposed to hydrostatic pressure of 800 psi (S8.8).

S7.3.10 Tensile strength. An air brake hose assembly (other than a coiled nylon tube assembly which meets the requirements of § 393.45 of

this title) designed for use between frame and axle or between a towed and a towing vehicle shall withstand, without separation of the hose from its end fittings, a pull of 250 pounds if it is ¼ in. or less in nominal internal diameter, or a pull of 325 pounds if it is larger than ¼ in. in nominal internal diameter. An air brake hose assembly designed for use in any other application shall withstand, without separation of the hose from its end fitting, a pull of 50 pounds if it is ¼ in. or less in nominal internal diameter, 150 pounds if it is ⅜ or ½ in. in nominal internal diameter, or 325 pounds if it is larger than ½ in. in nominal internal diameter (S8.9).

S7.3.11 Water absorption and tensile strength. After immersion in distilled water for 70 hours (S8.10), an air brake hose assembly (other than a coiled tube assembly which meets the requirements of § 393.45 of this title) designed for use between frame and axle or between a towed and a towing vehicle shall withstand without separation of the hose from its end fittings a pull of 250 pounds if it is ¼ in. or less in nominal internal diameter, or a pull of 325 pounds if it is larger than ¼ in. in nominal internal diameter. After immersion in distilled water for 70 hours (S8.10), an air brake hose assembly designed for use in any other application shall withstand without separation of the hose from its end fittings a pull of 50 pounds if it is ¼ in. or less in nominal internal diameter, 150 pounds if it is ⅜ or ½ in. in nominal internal diameter, or 325 pounds if it is larger than ½ in. in nominal internal diameter (S8.9).

S7.3.12 Zinc chloride resistance. The outer cover of an air brake hose shall not show cracks visible under 7-power magnification after immersion in a 50-percent zinc chloride aqueous solution for 200 hours (S8.11).

TABLE IV—Air Brake Hose Diameters and Test Cylinder Radii

| Hose, nominal diameter in inches | ⅛ | ⅜ | ¼ | ⅝ | ¾ | 1⅜ | 7/16 | ½ | ⅝ |
|--------------------------------------|----|---|----|---|----|----|------|---|----|
| Radius of test cylinder in inches | 1½ | 2 | 2½ | 3 | 3½ | 3½ | 4 | 4 | 4½ |

S7.3.13 End fitting corrosion resistance. After 24 hours of exposure to spray, air brake hose end fittings shall show no base metal corrosion on the end fitting surface except where crimping or the application of label information causes a displacement of the protective coating.

S8. Test procedures—Air brake hose, brake hose assemblies, and brake hose end fittings.

S8.1 High temperature resistance test.

(a) Utilize a cylinder having the radius indicated in Table IV for the size of hose tested.

(b) Bind the hose around the cylinder and condition it in an air oven for 70 hours at 212°F.

(c) Cool the hose to room temperature, remove it from the cylinder and straighten it.

(d) Without magnification, examine the hose externally and cut the hose lengthwise and examine the inner tube.

S8.2 Low temperature resistance test.

(a) Utilize a cylinder having the radius indicated in Table IV for the size of hose tested.

(b) Condition the cylinder and the brake hose, in a straight position, in a cold box at minus 40° F for 70 hours.

(c) With the hose and cylinder at minus 40° F, bend the hose 180 degrees around the cylinder at a steady rate in a period of 3 to 5 seconds.

S8.3 Oil resistance test. Utilize three test specimens and average the results.

S8.3.1 Preparation. Fashion a test specimen by cutting a rectangular block 2 inches long and not less than one-third of an inch in width, having a thickness of not more than one-sixteenth inch, from the brake hose and buff the specimen on both faces to ensure smooth surfaces.

S8.3.2 Measurement.

(a) Weigh each specimen to the nearest milligram in air (W1) and in distilled water (W2) at room temperature. If wetting is necessary to remove air bubbles, dip the specimen in acetone and thoroughly rinse it with distilled water.

(b) Immerse each specimen in ASTM No. 3 oil for 70 hours at 212° F and then cool in

ASTM No. 3 oil at room temperature for 30 to 60 minutes.

(c) Dip the specimen quickly in acetone and blot it lightly with filter paper.

(d) Weigh each specimen in a tared weighing bottle (W3) and in distilled water (W4) within five minutes of removal from the cooling liquid.

(e) Calculate the percentage increase in volume as follows:

$$\text{Percent of increase} = \frac{(W_3 - W_4) - (W_1 - W_2)}{(W_1 - W_2)} \times 100$$

S8.4 Ozone resistance test. Conduct the test specified in S6.8 using air brake hose.

S8.5 Length change test.

(a) Position a test hose in a straight, horizontal position, and apply air pressure of 10 psi thereto.

(b) Measure the hose to determine original free length.

(c) Without releasing the 10 psi, raise the air pressure to the test hose to 200 psi.

(d) Measure the hose under 200 psi to determine final free length. An elongation or contraction is an increase or decrease respectively, in the final free length from the original free length of the hose.

S8.6 Adhesion test.

S8.6.1 Apparatus. Utilize a power-driven apparatus of the inclination balance or pendulum type which is constructed so that:

(a) The recording head includes a freely rotating form with an outside diameter substantially the same as the inside diameter of the hose specimen to be placed on it;

(b) The freely rotating form is mounted so that its axis of rotation is in the plane of the ply being separated from the specimen and so that the applied force is perpendicular to the tangent of the specimen circumference at the line of separation;

(c) The rate of travel of the power-actuated grip is a uniform 1 inch per minute and the capacity of the machine is such that maximum applied tension during the test is not more than 85 percent nor less than 15 percent of the machine's rated capacity;

S7.3.3 Low temperature resistance. The outer cover of an air brake hose shall not show cracks visible without magnification as a result of conditioning at minus 40° F for 70 hours when bent around a cylinder having the radius specified in Table IV for the size of hose tested (S8.2).

S7.3.4 Oil resistance. After immersion in ASTM No. 3 oil for 70 hours at 212° F the volume of a specimen prepared from the inner tube and cover of an air brake hose shall not increase more than 100 percent (S8.3).

S7.3.5 Ozone resistance. The outer cover of an air brake hose shall not show cracks visible under 7-power magnification after exposure to ozone for 70 hours at 104° F (S8.4).

S7.3.6 Length change. An airbrake hose shall not contract in length more than 7 percent nor elongate more than 5 percent when subjected to air pressure of 200 psi (S8.5). “(other than a coiled nylon tube for use in an assembly that meets the requirements of § 393.45 of this title)” followed the phrase “An air brake hose.”

§ 7.3.7 Adhesion. “Except for hose reinforced by wire,” an airbrake hose shall withstand a tensile force of 8 pounds per inch of length before separation of adjacent layers (S8.6).

S7.3.8 Air pressure. An air brake hose assembly shall contain air pressure of 200 psi for 5 minutes without loss of more than 5 psi (S8.7).

S7.3.9 Burst strength. An air brake hose assembly shall not rupture when exposed to hydrostatic pressure of 800 psi (S8.8).

S7.3.10 Tensile strength. An air brake hose assembly (other than a coiled nylon tube assembly which meets the requirements of § 393.45 of

this title) designed for use between frame and axle or between a towed and a towing vehicle shall withstand, without separation of the hose from its end fittings, a pull of 250 pounds if it is ¼ in. or less in nominal internal diameter, or a pull of 325 pounds if it is larger than ¼ in. in nominal internal diameter. An air brake hose assembly designed for use in any other application shall withstand, without separation of the hose from its end fitting, a pull of 50 pounds if it is ¼ in. or less in nominal internal diameter, 150 pounds if it is ⅜ or ½ in. in nominal internal diameter, or 325 pounds if it is larger than ½ in. in nominal internal diameter (S8.9).

S7.3.11 Water absorption and tensile strength. After immersion in distilled water for 70 hours (S8.10), an air brake hose assembly (other than a coiled tube assembly which meets the requirements of § 393.45 of this title) designed for use between frame and axle or between a towed and a towing vehicle shall withstand without separation of the hose from its end fittings a pull of 250 pounds if it is ¼ in. or less in nominal internal diameter, or a pull of 325 pounds if it is larger than ¼ in. in nominal internal diameter. After immersion in distilled water for 70 hours (S8.10), an air brake hose assembly designed for use in any other application shall withstand without separation of the hose from its end fittings a pull of 50 pounds if it is ¼ in. or less in nominal internal diameter, 150 pounds if it is ⅜ or ½ in. in nominal internal diameter, or 325 pounds if it is larger than ½ in. in nominal internal diameter (S8.9).

S7.3.12 Zinc chloride resistance. The outer cover of an air brake hose shall not show cracks visible under 7-power magnification after immersion in a 50-percent zinc chloride aqueous solution for 200 hours (S8.11).

TABLE IV—Air Brake Hose Diameters and Test Cylinder Radii

| Hose, nominal diameter in inches | ⅛ | ⅜ | ¼ | ⅝ | ¾ | 1½ | 7/16 | ½ | ⅝ |
|--------------------------------------|----|---|----|---|----|----|------|---|----|
| Radius of test cylinder in inches | 1½ | 2 | 2½ | 3 | 3½ | 3½ | 4 | 4 | 4½ |

S7.3.13 End fitting corrosion resistance. After 24 hours of exposure to spray, air brake hose end fittings shall show no base metal corrosion on the end fitting surface except where crimping or the application of label information causes a displacement of the protective coating.

S8. Test procedures—Air brake hose, brake hose assemblies, and brake hose end fittings.

S8.1 High temperature resistance test.

(a) Utilize a cylinder having the radius indicated in Table IV for the size of hose tested.

(b) Bind the hose around the cylinder and condition it in an air oven for 70 hours at 212°F.

(c) Cool the hose to room temperature, remove it from the cylinder and straighten it.

(d) Without magnification, examine the hose externally and cut the hose lengthwise and examine the inner tube.

S8.2 Low temperature resistance test.

(a) Utilize a cylinder having the radius indicated in Table IV for the size of hose tested.

(b) Condition the cylinder and the brake hose, in a straight position, in a cold box at minus 40° F for 70 hours.

(c) With the hose and cylinder at minus 40° F, bend the hose 180 degrees around the cylinder at a steady rate in a period of 3 to 5 seconds.

S8.3 Oil resistance test. Utilize three test specimens and average the results.

S8.3.1 Preparation. Fashion a test specimen by cutting a rectangular block 2 inches long and not less than one-third of an inch in width, having a thickness of not more than one-sixteenth inch, from the brake hose and buff the specimen on both faces to ensure smooth surfaces.

S8.3.2 Measurement.

(a) Weigh each specimen to the nearest milligram in air (W1) and in distilled water (W2) at room temperature. If wetting is necessary to remove air bubbles, dip the specimen in acetone and thoroughly rinse it with distilled water.

(b) Immerse each specimen in ASTM No. 3 oil for 70 hours at 212° F and then cool in

ASTM No. 3 oil at room temperature for 30 to 60 minutes.

(c) Dip the specimen quickly in acetone and blot it lightly with filter paper.

(d) Weigh each specimen in a tared weighing bottle (W3) and in distilled water (W4) within five minutes of removal from the cooling liquid.

(e) Calculate the percentage increase in volume as follows:

$$\text{Percent of increase} = \frac{(W_3 - W_4) - (W_1 - W_2)}{(W_1 - W_2)} \times 100$$

S8.4 Ozone resistance test. Conduct the test specified in S6.8 using air brake hose.

S8.5 Length change test.

(a) Position a test hose in a straight, horizontal position, and apply air pressure of 10 psi thereto.

(b) Measure the hose to determine original free length.

(c) Without releasing the 10 psi, raise the air pressure to the test hose to 200 psi.

(d) Measure the hose under 200 psi to determine final free length. An elongation or contraction is an increase or decrease respectively, in the final free length from the original free length of the hose.

S8.6 Adhesion test.

S8.6.1 Apparatus. Utilize a power-driven apparatus of the inclination balance or pendulum type which is constructed so that:

(a) The recording head includes a freely rotating form with an outside diameter substantially the same as the inside diameter of the hose specimen to be placed on it;

(b) The freely rotating form is mounted so that its axis of rotation is in the plane of the ply being separated from the specimen and so that the applied force is perpendicular to the tangent of the specimen circumference at the line of separation;

(c) The rate of travel of the power-actuated grip is a uniform 1 inch per minute and the capacity of the machine is such that maximum applied tension during the test is not more than 85 percent nor less than 15 percent of the machine's rated capacity;

(d) The machine operates with no device for maintaining maximum load indication, and in a pendulum type machine, the weight level swings as a free pendulum without engagement of pawls; and

(e) The machine produces a chart with inches of separation as one coordinate and applied tension as the other.

S8.6.2 Preparation.

(a) Cut a test specimen of 1 inch or more in length from the hose to be tested and cut the layer to be tested of that test specimen longitudinally along its entire length to the level of contact with the adjacent layer.

(b) Peel the layer to be tested from the adjacent layer to create a flap large enough to permit attachment of the power-actuated clamp of the apparatus.

(c) Mount the test specimen on the freely rotating form with the separated layer attached to the power-actuated clamp.

S8.6.3 Operation. Reserved

S8.6.4 Calculations.

(a) The adhesion value shall be the minimum force recorded on the portion of the chart corresponding to the actual separation of the part being tested.

(a) Express the force in pounds per inch of length.

S8.7 Air pressure test.

(a) Connect the air brake hose assembly to a source of air pressure.

(b) Apply 200 psi air pressure to the hose and seal the hose from the source of air pressure.

(c) After 5 minutes, determine the air pressure remaining in the test specimen.

8.8 Burst strength test.

(a) Utilize an air brake hose assembly.

(b) Fill the hose assembly with water, allowing all gases to escape. Apply water pressure at a uniform rate of increase of approximately 1,000 psi per minute until the hose ruptures.

S8.9 Tensile strength test. Utilize a tension testing machine conforming to the requirements of the Methods of Verification of Testing Machines (1964 American Society for Testing and Materials, Designation E4), and provided with a recording device to register total pull in pounds.

(a) Attach an air brake hose assembly to the testing machine to permit straight, even, machine-pull on the hose.

(b) Apply tension at a rate of 1 inch per minute travel of the moving head until separation occurs.

TABLE V—Vacuum Brake Hose Test Requirements

| Hose—Inside diameter, ins. | High Temperature Resistance | | Low Temperature Resistance | | Bend | | Deformation Collapsed ID (dimension D), inches |
|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------|-----------------------------|--|
| | Hose Length, inches | Radius of Cylinder, inches | Hose Length, inches | Radius of Cylinder, inches | Hose Length, inches | Max. Collapse of OD, inches | |
| 7/32 | 8 | 1 1/2 | 17 1/2 | 3 | 7 | 1 1/64 | 3/64 |
| 1/4 | 9 | 1 1/2 | 17 1/2 | 3 | 8 | 3/32 | 1/16 |
| 9/32 | 9 | 1 3/4 | 19 | 3 1/2 | 9 | 12/64 | 4/64 |
| 1 1/32 | 9 | 1 3/4 | 19 | 3 1/2 | 11 | 13/64 | 5/64 |
| 3/8 | 10 | 1 3/4 | 19 | 3 1/2 | 12 | 5/32 | 3/32 |
| 7/16 | 11 | 2 | 20 1/2 | 4 | 14 | 17/64 | 5/64 |
| 15/32 | 11 | 2 | 20 1/2 | 4 | 14 | 17/64 | 5/64 |
| 1/2 | 11 | 2 | 20 1/2 | 4 | 16 | 7/32 | 1/8 |
| 5/8 | 12 | 2 1/4 | 22 | 4 1/2 | 22 | 7/32 | 5/32 |
| 3/4 | 14 | 2 1/2 | 24 | 5 | 28 | 7/32 | 3/16 |
| 1.0 | 16 | 3 1/4 | 28 1/2 | 6 1/2 | 36 | 9/32 | 1/4 |

S8.10 Water absorption and tensile strength test. Immerse an air brake hose assembly in distilled water at room temperature for 70 hours. Thirty minutes after removal from the water, conduct the test specified in S8.9.

S8.11 Zinc chloride resistance test. Immerse an air brake hose in a 50-percent zinc chloride aqueous solution at room temperature for 200 hours. Remove it from the solution and examine it under 7-power magnification for cracks.

S8.12 End fitting corrosion resistance test. Conduct the test specified in S6.9 using an air brake hose assembly.

S9. Requirements—vacuum brake hose, brake hose assemblies, and brake hose end fittings.

9.1 Labeling.

S9.1.1 Hose. Each vacuum brake hose shall be labeled, or cut from bulk hose that is labeled, at intervals of not more than 6 inches, measured from the end of one legend to the beginning of the next, in block capital letters and numerals at least one-eighth of an inch high, with the information listed in paragraphs (a) through (e). The information need not be present on hose after it has become part of a brake hose assembly or after it has been installed in a motor vehicle.

(a) The symbol DOT, constituting a certification by the hose manufacturer that the hose conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of the hose, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

(c) The month, day, and year, or the month and year, of manufacture, expressed in numerals. For example, 10/1/74 means October 1, 1974.

(d) The nominal inside diameter of the hose expressed in inches or fractions of inches, or the nominal outside diameter of plastic tubing expressed in inches or fractions of inches followed

by the letters OD (Example of inside diameter: 7/32, 1/4. Example of outside diameter: 1/4 OD.)

(e) The letters "VL" or "VH" shall indicate that the component is a light-duty vacuum brake hose or heavy-duty vacuum brake hose, respectively.

S9.1.2 End Fittings. Except for an end fitting that is attached by heat shrinking or by interference fit with plastic vacuum hose or that is attached by deformation of the fitting about a hose by crimping or swaging, at least one component of each vacuum brake hose fitting shall be etched, embossed, or stamped in block capital letters and numerals at least one-sixteenth of an inch high with the following information:

(a) The symbol DOT, constituting a certification by the manufacturer of that component that the component conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of that component of the fitting, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

(c) The letters "VL" or "VH" shall indicate that the end fitting is intended for use in a light-duty or heavy-duty vacuum brake system, respectively.

(d) The nominal inside diameter of the hose to which the fitting is properly attached expressed in inches or fractions of inches, or the outside diameter of the plastic tubing to which the fitting properly attached expressed in inches or fractions of inches followed by the letters OD (See examples in S9.1.1 (d)).

S9.1.3 Assemblies. Each vacuum brake hose assembly made with end fittings that are attached by crimping or swaging and each plastic tube assembly made with end fittings that are attached by heat shrinking or dimensional interference fit, except those assembled and installed by a vehicle manufacturer in vehicles manufactured by him, shall be labeled by means of a band around the brake hose assembly as specified in this para-

- (d) The machine operates with no device for maintaining maximum load indication, and in a pendulum type machine, the weight level swings as a free pendulum without engagement of pawls; and
- (e) The machine produces a chart with inches of separation as one coordinate and applied tension as the other.

S8.6.2 Preparation.

- (a) Cut a test specimen of 1 inch or more in length from the hose to be tested and cut the layer to be tested of that test specimen longitudinally along its entire length to the level of contact with the adjacent layer.
- (b) Peel the layer to be tested from the adjacent layer to create a flap large enough to permit attachment of the power-actuated clamp of the apparatus.
- (c) Mount the test specimen on the freely rotating form with the separated layer attached to the power-actuated clamp.

S8.6.3 Operation. Reserved

S8.6.4 Calculations.

- (a) The adhesion value shall be the minimum force recorded on the portion of the chart corresponding to the actual separation of the part being tested.
- (a) Express the force in pounds per inch of length.

S8.7 Air pressure test.

- (a) Connect the air brake hose assembly to a source of air pressure.
- (b) Apply 200 psi air pressure to the hose and seal the hose from the source of air pressure.
- (c) After 5 minutes, determine the air pressure remaining in the test specimen.

8.8 Burst strength test.

- (a) Utilize an air brake hose assembly.
- (b) Fill the hose assembly with water, allowing all gases to escape. Apply water pressure at a uniform rate of increase of approximately 1,000 psi per minute until the hose ruptures.

S8.9 Tensile strength test. Utilize a tension testing machine conforming to the requirements of the Methods of Verification of Testing Machines (1964 American Society for Testing and Materials, Designation E4), and provided with a recording device to register total pull in pounds.

- (a) Attach an air brake hose assembly to the testing machine to permit straight, even, machine-pull on the hose.
- (b) Apply tension at a rate of 1 inch per minute travel of the moving head until separation occurs.

TABLE V—Vacuum Brake Hose Test Requirements

| Hose—Inside diameter, ins. | High Temperature Resistance | | Low Temperature Resistance | | Bend | | Deformation Collapsed ID (dimension D), inches |
|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------|-----------------------------|--|
| | Hose Length, inches | Radius of Cylinder, inches | Hose Length, inches | Radius of Cylinder, inches | Hose Length, inches | Max. Collapse of OD, inches | |
| 7/32 | 8 | 1½ | 17½ | 3 | 7 | 11/64 | 3/64 |
| 1/4 | 9 | 1½ | 17½ | 3 | 8 | 3/32 | 1/16 |
| 9/32 | 9 | 1¾ | 19 | 3½ | 9 | 12/64 | 3/64 |
| 11/32 | 9 | 1¾ | 19 | 3½ | 11 | 13/64 | 5/64 |
| 3/8 | 10 | 1¾ | 19 | 3½ | 12 | 5/32 | 7/32 |
| 7/16 | 11 | 2 | 20½ | 4 | 14 | 17/64 | 5/64 |
| 15/32 | 11 | 2 | 20½ | 4 | 14 | 17/64 | 5/64 |
| 1/2 | 11 | 2 | 20½ | 4 | 16 | 7/32 | 1/8 |
| 5/8 | 12 | 2¼ | 22 | 4½ | 22 | 7/32 | 5/32 |
| 3/4 | 14 | 2½ | 24 | 5 | 28 | 7/32 | 3/16 |
| 1.0 | 16 | 3¼ | 28½ | 6½ | 36 | 9/32 | ¼ |

S8.10 Water absorption and tensile strength test. Immerse an air brake hose assembly in distilled water at room temperature for 70 hours. Thirty minutes after removal from the water, conduct the test specified in S8.9.

S8.11 Zinc chloride resistance test. Immerse an air brake hose in a 50-percent zinc chloride aqueous solution at room temperature for 200 hours. Remove it from the solution and examine it under 7-power magnification for cracks.

S8.12 End fitting corrosion resistance test. Conduct the test specified in S6.9 using an air brake hose assembly.

S9. Requirements—vacuum brake hose, brake hose assemblies, and brake hose end fittings.

9.1 Labeling.

S9.1.1 Hose. Each vacuum brake hose shall be labeled, or cut from bulk hose that is labeled, at intervals of not more than 6 inches, measured from the end of one legend to the beginning of the next, in block capital letters and numerals at least one-eighth of an inch high, with the information listed in paragraphs (a) through (e). The information need not be present on hose after it has become part of a brake hose assembly or after it has been installed in a motor vehicle.

(a) The symbol DOT, constituting a certification by the hose manufacturer that the hose conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of the hose, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

(c) The month, day, and year, or the month and year, of manufacture, expressed in numerals. For example, 10/1/74 means October 1, 1974.

(d) The nominal inside diameter of the hose expressed in inches or fractions of inches, or the nominal outside diameter of plastic tubing expressed in inches or fractions of inches followed

by the letters OD (Example of inside diameter: 7/32, 1/4. Example of outside diameter: 1/4 OD.)

(e) The letters “VL” or “VH” shall indicate that the component is a light-duty vacuum brake hose or heavy-duty vacuum brake hose, respectively.

S9.1.2 End Fittings. Except for an end fitting that is attached by heat shrinking or by interference fit with plastic vacuum hose or that is attached by deformation of the fitting about a hose by crimping or swaging, at least one component of each vacuum brake hose fitting shall be etched, embossed, or stamped in block capital letters and numerals at least one-sixteenth of an inch high with the following information:

(a) The symbol DOT, constituting a certification by the manufacturer of that component that the component conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of that component of the fitting, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

(c) The letters “VL” or “VH” shall indicate that the end fitting is intended for use in a light-duty or heavy-duty vacuum brake system, respectively.

(d) The nominal inside diameter of the hose to which the fitting is properly attached expressed in inches or fractions of inches, or the outside diameter of the plastic tubing to which the fitting properly attached expressed in inches or fractions of inches followed by the letters OD (See examples in S9.1.1 (d)).

S9.1.3 Assemblies. Each vacuum brake hose assembly made with end fittings that are attached by crimping or swaging and each plastic tube assembly made with end fittings that are attached by heat shrinking or dimensional interference fit, except those assembled and installed by a vehicle manufacturer in vehicles manufactured by him, shall be labeled by means of a band around the brake hose assembly as specified in this para-

graph or, at the option of the manufacturer, by means of labeling as specified in S9.1.3.1 The band may at the manufacturer's option attached so as to move freely along the length of the assembly, as long as it is retained by the end fittings. The band shall be etched, embossed, or stamped, in block capital letters and numerals at least one-eighth of an inch high, with the following information:

(a) The symbol DOT, constituting certification by the hose assembler that the hose assembly conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of the hose assembly, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

S9.1.3.1 At least one end fitting of a vacuum brake hose assembly made with end fittings that are attached by crimping or swaging, or of a plastic tubing assembly made with end fittings that are attached by heat shrinking or dimensional interference fit shall be etched, stamped, or embossed with a designation at least one-sixteenth of an inch high that identifies the manufacturer of the hose assembly and is filed in accordance with S9.1.3(b).

S9.2 Test requirements. Each vacuum brake hose assembly or appropriate part thereof shall be capable of meeting any of the requirements set forth under this heading, when tested under the conditions of S11 and the applicable procedures of S10. However, a particular hose assembly or appropriate part thereof need not meet further requirements after having met the constriction requirement (S9.2.1) and then having been subjected to any one of the requirements specified in S9.2.2 through S9.2.11.

S9.2.1 Constriction. Except for that part of an end fitting which does not contain hose, every inside diameter of any section of a vacuum brake hose assembly shall be not less than 75 percent of the nominal inside diameter of the hose if for

heavy duty, or 70 percent of the nominal inside diameter of the hose if for light duty.

S9.2.2 High temperature resistance. A vacuum brake hose shall not show external or internal cracks, charring, or disintegration visible without magnification when straightened after being bent for 70 hours at 212° F over a cylinder having the radius specified in Table V for the size of hose tested (S10.1).

S9.2.3 Low temperature resistance. A vacuum brake hose shall not show cracks visible without magnification after conditioning at minus 40° F for 70 hours when bent around a cylinder having the radius specified in Table V for the size hose Tested (S10.2).

S9.2.4 Ozone resistance. A vacuum brake hose shall not show cracks visible under 7-power magnification after exposure to ozone for 70 hours (S10.3).

S9.2.5 Burst strength. A vacuum brake hose shall not rupture under hydrostatic pressure of 350 psi (S10.4).

S9.2.6 Vacuum. The collapse of the outside diameter of a vacuum brake hose under internal vacuum of 26 inches of Hg for five minutes shall not exceed one-sixteenth of an inch (S10.5).

S9.2.7 Bend. The collapse of the outside diameter of a vacuum brake hose at the middle point of the test length when bent until the ends touch shall not exceed the values given in Table V for the size of hose tested (S10.6).

S9.2.8 Swell. Following exposure to Reference Fuel A, every inside diameter of any section of a vacuum brake hose shall be not less than 75 percent of the nominal inside of the hose if for heavy duty, or 70 percent of the nominal inside diameter of the hose if for light duty. The vacuum brake hose shall show no leakage and there shall be no separation of the inner tube from the fabric reinforcement of the hose in a vacuum test of 26 inches of Hg for 10 minutes (S10.7).

S9.2.9 Adhesion. “Except for hose reinforced by wire,” a vacuum brake hose shall withstand a force of 8 pounds per inch of length before separation of adjacent layers (S10.8).

S9.2.10 Deformation. A vacuum brake hose shall return to 90 percent of its original outside diameter within 60 seconds after five applications of force as specified in S10.9, except that a wire-reinforced hose need only return to 85 percent of its original outside diameter. In the case of heavy-duty hose the first application of force shall not exceed a peak value of 70 pounds, and the fifth application of force shall reach a

peak value of at least 40 pounds. In the case of light-duty hose the first application of force shall not exceed a peak value of 50 pounds, and the fifth application of force shall reach a peak value of at least 20 pounds (S10.9).

S9.2.11 End fitting corrosion resistance. After 24 hours of exposure to salt spray, vacuum brake hose end fittings shall show no base metal corrosion of the end fitting surface except where crimping or the application of labeling information has caused displacement of the protective coating.

S10. Test procedures—Vacuum brake hose, brake hose assemblies, and brake hose and fittings.

S10.1 High temperature resistance test. Conduct the test specified in S8.1 using vacuum brake hose with the cylinder radius specified in Table V for the size of hose tested.

S10.2 Low temperature resistance test. Conduct the test specified in S8.2 using vacuum brake hose with the cylinder radius specified in Table V for the size of hose tested.

S10.3 Ozone resistance test. Conduct the test specified in S6.8 using vacuum brake hose.

S10.4 Burst strength test. Conduct the test specified in S8.8 using vacuum brake hose.

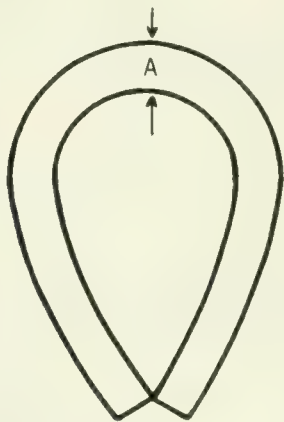


Fig. 3—Bend Test of Vacuum Brake Hose.

TABLE VI
Dimensions of Test Specimen and Feeler Gage for Deformation Test

| Inside Diameter of Hose (inch) | Specimen Dimensions (see Fig. 4) | | Feeler Gage Dimensions | |
|-----------------------------------|-------------------------------------|----------|------------------------|---------------------|
| | D (inch) | L (inch) | Width (inch) | Thickness (inch) |
| 7/32 | 3/64 | 1 | 1/8 | 3/64 |
| 1/4 | 1/16 | 1 | 1/8 | 1/16 |
| 9/32 | 1/16 | 1 | 1/8 | 1/16 |
| 11/32 | 5/64 | 1 | 3/16 | 5/64 |
| 3/8 | 3/32 | 1 | 3/16 | 3/32 |
| 7/16 | 5/64 | 1 | 1/4 | 5/64 |
| 15/32 | 5/64 | 1 | 1/4 | 5/64 |
| 1/2 | 1/8 | 1 | 1/4 | 1/8 |
| 5/8 | 5/32 | 1 | 1/4 | 5/32 |
| 3/4 | 3/16 | 1 | 1/4 | 3/16 |
| 1.0 | 1/4 | 1 | 1/4 | 1/4 |

graph or, at the option of the manufacturer, by means of labeling as specified in S9.1.3.1 The band may at the manufacturer's option attached so as to move freely along the length of the assembly, as long as it is retained by the end fittings. The band shall be etched, embossed, or stamped, in block capital letters and numerals at least one-eighth of an inch high, with the following information:

(a) The symbol DOT, constituting certification by the hose assembler that the hose assembly conforms to all applicable motor vehicle safety standards.

(b) A designation that identifies the manufacturer of the hose assembly, which shall be filed in writing with: Office of Vehicle Safety Standards, Crash Avoidance Division, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. The designation may consist of block capital letters, numerals, or a symbol.

S9.1.3.1 At least one end fitting of a vacuum brake hose assembly made with end fittings that are attached by crimping or swaging, or of a plastic tubing assembly made with end fittings that are attached by heat shrinking or dimensional interference fit shall be etched, stamped, or embossed with a designation at least one-sixteenth of an inch high that identifies the manufacturer of the hose assembly and is filed in accordance with S9.1.3(b).

S9.2 Test requirements. Each vacuum brake hose assembly or appropriate part thereof shall be capable of meeting any of the requirements set forth under this heading, when tested under the conditions of S11 and the applicable procedures of S10. However, a particular hose assembly or appropriate part thereof need not meet further requirements after having met the constriction requirement (S9.2.1) and then having been subjected to any one of the requirements specified in S9.2.2 through S9.2.11.

S9.2.1 Constriction. Except for that part of an end fitting which does not contain hose, every inside diameter of any section of a vacuum brake hose assembly shall be not less than 75 percent of the nominal inside diameter of the hose if for

heavy duty, or 70 percent of the nominal inside diameter of the hose if for light duty.

S9.2.2 High temperature resistance. A vacuum brake hose shall not show external or internal cracks, charring, or disintegration visible without magnification when straightened after being bent for 70 hours at 212° F over a cylinder having the radius specified in Table V for the size of hose tested (S10.1).

S9.2.3 Low temperature resistance. A vacuum brake hose shall not show cracks visible without magnification after conditioning at minus 40° F for 70 hours when bent around a cylinder having the radius specified in Table V for the size hose Tested (S10.2).

S9.2.4 Ozone resistance. A vacuum brake hose shall not show cracks visible under 7-power magnification after exposure to ozone for 70 hours (S10.3).

S9.2.5 Burst strength. A vacuum brake hose shall not rupture under hydrostatic pressure of 350 psi (S10.4).

S9.2.6 Vacuum. The collapse of the outside diameter of a vacuum brake hose under internal vacuum of 26 inches of Hg for five minutes shall not exceed one-sixteenth of an inch (S10.5).

S9.2.7 Bend. The collapse of the outside diameter of a vacuum brake hose at the middle point of the test length when bent until the ends touch shall not exceed the values given in Table V for the size of hose tested (S10.6).

S9.2.8 Swell. Following exposure to Reference Fuel A, every inside diameter of any section of a vacuum brake hose shall be not less than 75 percent of the nominal inside of the hose if for heavy duty, or 70 percent of the nominal inside diameter of the hose if for light duty. The vacuum brake hose shall show no leakage and there shall be no separation of the inner tube from the fabric reinforcement of the hose in a vacuum test of 26 inches of Hg for 10 minutes (S10.7).

S9.2.9 Adhesion. “Except for hose reinforced by wire,” a vacuum brake hose shall withstand a force of 8 pounds per inch of length before separation of adjacent layers (S10.8).

S9.2.10 Deformation. A vacuum brake hose shall return to 90 percent of its original outside diameter within 60 seconds after five applications of force as specified in S10.9, except that a wire-reinforced hose need only return to 85 percent of its original outside diameter. In the case of heavy-duty hose the first application of force shall not exceed a peak value of 70 pounds, and the fifth application of force shall reach a

peak value of at least 40 pounds. In the case of light-duty hose the first application of force shall not exceed a peak value of 50 pounds, and the fifth application of force shall reach a peak value of at least 20 pounds (S10.9).

S9.2.11 End fitting corrosion resistance. After 24 hours of exposure to salt spray, vacuum brake hose end fittings shall show no base metal corrosion of the end fitting surface except where crimping or the application of labeling information has caused displacement of the protective coating.

S10. Test procedures—Vacuum brake hose, brake hose assemblies, and brake hose and fittings.

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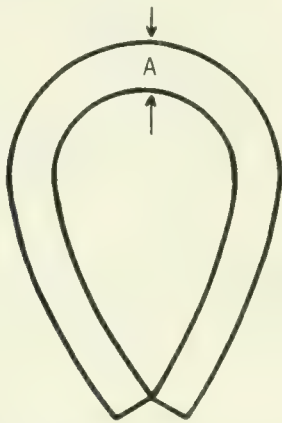


Fig. 3 – Bend Test of Vacuum Brake Hose.

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| 5/8 | 5/32 | 1 | 1/4 | 5/32 |
| 3/4 | 3/16 | 1 | 1/4 | 3/16 |
| 1.0 | 1/4 | 1 | 1/4 | 1/4 |

S10.5 Vacuum test. Utilize a 12-inch vacuum brake hose assembly sealed at one end.

(a) Measure the hose outside diameter.

(b) Attach the hose to a source of vacuum and subject it to a vacuum of 26 inches of Hg for 5 minutes.

(c) Measure the hose to determine the minimum outside diameter while the hose is still subject to vacuum.

§ 10.6 Bend test.

(a) Bend a vacuum brake hose, of the length prescribed in Table V, in the direction of its normal curvature until then ends just touch, as shown in Figure 3.

(b) Measure the outside diameter of the specimen at point A before and after bending.

(c) The difference between the two measurements is the collapse of the hose outside diameter on bending.

S10.7 Swell test.

(a) Fill a specimen of vacuum brake hose 12 inches long with Reference Fuel A as described in the Method of Test for Change in Properties of Elastomeric Vulcanizers Resulting From Immersion in Liquids (1964 American Society for Testing and Materials Designation D471).

(b) Maintain reference fuel in the hose under atmospheric pressure at room temperature for 48 hours.

(c) Remove fuel and determine that every inside diameter of any section of the brake hose is not less than 75 percent of the nominal inside diameter of the hose for heavy-duty hose and 70 percent of the nominal inside diameter of the hose for light-duty hose.

(d) Subject the hose specimen to a vacuum of 26 inches of Hg for 10 minutes.

S10.8 Adhesion test. Conduct the test specified in S8.6 using vacuum brake hose.

S10.9 Deformation test. Table VI specifies the test specimen dimensions.

S10.9.1 Apparatus. Utilize a compression device, equipped to measure force of at least 100 pounds, and feeler gauges of sufficient length to be passed completely through the test specimen.

S10.9.2 Operation.

(a) Position the test specimen longitudinally in the compression device with the fabric laps not in the line of the applied pressure.

(b) Apply gradually increasing force to the test specimen to compress its inside diameter to that specified in Table VI (dimension D of Figure 4) for the size of hose tested.

(c) After 5 seconds release the force and record the peak load applied.

(d) Repeat the procedure four times permitting a 10-second recovery period between load applications.

S10.10 End fitting corrosion resistance test.

Conduct the test specified in S6.9 using a vacuum brake hose assembly.

S11. Test conditions. Each hose assembly or appropriate part thereof shall be able to meet the requirements of S5, S7, and S9 under the following conditions.

S11.1 The temperature of the testing room is 75° F.

S11.2 Except for S6.6, S8.2, and S10.2, the test samples are stabilized at test room temperature prior to testing.

S11.3 The brake hoses and brake hose assemblies are at least 24 hours old, and unused.

S12. Notwithstanding any other provision of this standard, a brake hose assembly shall meet each requirement of this standard, except that the assembly may be constructed of brake hose which meets every requirement of the standard for hose other than the hose labeling requirements of S5.2, S7.2, and S9.1, and the assembly may be constructed of end fittings which meet every requirement of the standard for end fittings other

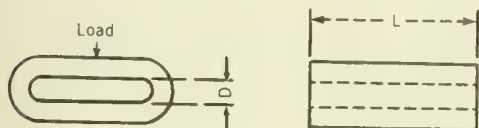


Fig 4 -Deformed Specimen of Vacuum Brake Hose

than the end fitting labeling requirements of S5.2, S7.2, and S9.1.

S13. Notwithstanding any other provision of this standard, a vehicle to which this standard applies shall be equipped with brake hose, brake hose end fittings, and brake hose assemblies that meet each requirement of this standard, with the following exceptions:

(a) The vehicle may be equipped with brake hose that meets every requirement of the standard for hose other than the hose labeling requirements of S5.2, S7.2, and S9.1;

(b) The vehicle may be equipped with end fittings that meet every requirement of the standard for end fittings other than the end fitting labeling requirements of S5.2, S7.2, and S9.1; and

(c) The vehicle may be equipped with brake hose assemblies that meet every requirement of the standard for assemblies other than the assembly labeling requirements of S5.2, S7.2, and S9.1.

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November 13, 1973**

S10.5 Vacuum test. Utilize a 12-inch vacuum brake hose assembly sealed at one end.

(a) Measure the hose outside diameter.

(b) Attach the hose to a source of vacuum and subject it to a vacuum of 26 inches of Hg for 5 minutes.

(c) Measure the hose to determine the minimum outside diameter while the hose is still subject to vacuum.

§ 10.6 Bend test.

(a) Bend a vacuum brake hose, of the length prescribed in Table V, in the direction of its normal curvature until then ends just touch, as shown in Figure 3.

(b) Measure the outside diameter of the specimen at point A before and after bending.

(c) The difference between the two measurements is the collapse of the hose outside diameter on bending.

S10.7 Swell test.

(a) Fill a specimen of vacuum brake hose 12 inches long with Reference Fuel A as described in the Method of Test for Change in Properties of Elastomeric Vulcanizers Resulting From Immersion in Liquids (1964 American Society for Testing and Materials Designation D471).

(b) Maintain reference fuel in the hose under atmospheric pressure at room temperature for 48 hours.

(c) Remove fuel and determine that every inside diameter of any section of the brake hose is not less than 75 percent of the nominal inside diameter of the hose for heavy-duty hose and 70 percent of the nominal inside diameter of the hose for light-duty hose.

(d) Subject the hose specimen to a vacuum of 26 inches of Hg for 10 minutes.



Fig 4-Deformed Specimen of Vacuum Brake Hose

S10.8 Adhesion test. Conduct the test specified in S8.6 using vacuum brake hose.

S10.9 Deformation test. Table VI specifies the test specimen dimensions.

S10.9.1 Apparatus. Utilize a compression device, equipped to measure force of at least 100 pounds, and feeler gauges of sufficient length to be passed completely through the test specimen.

S10.9.2 Operation.

(a) Position the test specimen longitudinally in the compression device with the fabric laps not in the line of the applied pressure.

(b) Apply gradually increasing force to the test specimen to compress its inside diameter to that specified in Table VI (dimension D of Figure 4) for the size of hose tested.

(c) After 5 seconds release the force and record the peak load applied.

(d) Repeat the procedure four times permitting a 10-second recovery period between load applications.

S10.10 End fitting corrosion resistance test.

Conduct the test specified in S6.9 using a vacuum brake hose assembly.

S11. Test conditions. Each hose assembly or appropriate part thereof shall be able to meet the requirements of S5, S7, and S9 under the following conditions.

S11.1 The temperature of the testing room is 75° F.

S11.2 Except for S6.6, S8.2, and S10.2, the test samples are stabilized at test room temperature prior to testing.

S11.3 The brake hoses and brake hose assemblies are at least 24 hours old, and unused.

S12. Notwithstanding any other provision of this standard, a brake hose assembly shall meet each requirement of this standard, except that the assembly may be constructed of brake hose which meets every requirement of the standard for hose other than the hose labeling requirements of S5.2, S7.2, and S9.1, and the assembly may be constructed of end fittings which meet every requirement of the standard for end fittings other

than the end fitting labeling requirements of S5.2, S7.2, and S9.1.

S13. Notwithstanding any other provision of this standard, a vehicle to which this standard applies shall be equipped with brake hose, brake hose end fittings, and brake hose assemblies that meet each requirement of this standard, with the following exceptions:

(a) The vehicle may be equipped with brake hose that meets every requirement of the standard for hose other than the hose labeling requirements of S5.2, S7.2, and S9.1;

(b) The vehicle may be equipped with end fittings that meet every requirement of the standard for end fittings other than the end fitting labeling requirements of S5.2, S7.2, and S9.1; and

(c) The vehicle may be equipped with brake hose assemblies that meet every requirement of the standard for assemblies other than the assembly labeling requirements of S5.2, S7.2, and S9.1.

**38 F.R. 31302
November 13, 1973**

MOTOR VEHICLE SAFETY STANDARD NO. 107
Reflecting Surfaces—Passenger Cars, Multipurpose Passenger
Vehicles, Trucks, and Buses

S1. Purpose and scope. This standard specifies reflecting surface requirements for certain vehicle components in the driver's field of view.

S2. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S3. Definitions. "Field of view" means the area forward of a lateral vertical plane which is located tangent to the rearmost boundary of the SAE 99th percentile eye range contour of SAE Recommended Practice J941, November 1965. "Specular gloss" means the luminous fractional reflectance of a specimen at the specular direction.

S4. Requirements. The specular gloss of the surface of the materials used for the following bright metal components in the driver's field of view shall not exceed 40 units when measured by the 20° method of ASTM Standard D523-62T, June 1962—

- (a) Windshield wiper arms and blades;
- (b) Inside windshield mouldings;
- (c) Horn ring and hub of steering wheel assembly; and
- (d) Inside rearview mirror frame and mounting bracket.

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February 3, 1967

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32 F.R. 2411
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PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, Buses, Trailers and Motorcycles (Docket No. 69-18)

On January 3, 1970, a proposal to amend Federal Motor Vehicle Safety Standard No. 108 (Docket No. 69-18) was published in the *Federal Register* (35 F.R. 106). Comments were requested on 25 proposed amendments.

Interested persons have been afforded an opportunity to participate in the rulemaking process and their comments have been considered in the amendments published today. Except as otherwise noted, the amendments are effective July 1, 1971. The amendments are discussed below in the order in which the proposals were published. Unless otherwise indicated, there were no significant objections to the proposals that are being adopted.

(a) It was proposed that Standard No. 108 be extended to include requirements for replacement lighting equipment on vehicles manufactured to comply with Standard No. 108, and all replacement sealed beam headlamp units, lamp bulbs, and plastic lenses.

The proposal to include replacement equipment on vehicles manufactured on or after the effective date of the standard (July 1, 1971) has been adopted. However, the proposal to include all replacement sealed beam headlamp units, lamp bulbs, and plastic lenses on vehicles manufactured prior to that date has been deferred because of the difficulties involved in retrofitting vehicles that were not originally manufactured to conform to Standard No. 108. Further study is necessary of the problems, leadtime, and costs

involved in designing and testing replacement equipment for older vehicles that meets the standards required of motor vehicles manufactured today.

(b) The present intermediate side marker device requirement covering vehicles 30 feet or more in overall length, and 80 inches and more in overall width, has been extended to cover vehicles of lesser width.

Commenters requested that the overall length of a trailer be interpreted to exclude the length of the trailer tongue. However, it has been determined that when the rear of a trailer is 30 feet or more from the towing vehicle, intermediate side marker devices are warranted, regardless of the length of the trailer tongue.

(c) SAE Standard J594d, "Reflex Reflectors", has replaced J594c as the basic reference for this item of lighting equipment. Some commenters felt that Class B reflectors (eliminated in J594d) should still be permitted for motorcycles, but the Bureau believes that a motor vehicle whose conspicuity is already marginal should be required to have Class A reflectors.

(d) Self-canceling turn signal operating units will be required on all vehicles less than 80 inches in overall width. One commenter requested excluding all trucks, truck tractors, and commercial vehicles regardless of vehicle width, and several commenters requested the elimination of the requirement for cancellation by steering wheel rotation.

Since the operation of vehicles less than 80 inches in overall width is similar to that of passenger vehicles and other vehicles of lesser width are operated by drivers other than pro-

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professionals, their exclusion from this requirement is not warranted.

The Bureau is studying automatic cancellation by time or distance, or both, but current evidence indicates that these methods, given the state of the art, are inferior to cancellation by steering wheel rotation.

(e) As proposed, amber has been eliminated as an optional color of the stop lamp.

(f) The minimum candlepower of any separately mounted stoplamp will equal that of a Class A turn signal lamp.

Many commenters requested a longer leadtime to comply. The requests have been found reasonable, and good cause has been shown for an effective date of January 1, 1973. Other comments suggested consideration of stop lamp candlepower in connection with dual intensity signals, allowance for multiple compartment lamps, and retention of the present Class B intensity for motorcycle stop lamps.

Dual intensity signals have not been proposed, and since time is required for development and implementation of such a proposal, a requirement for increased minimum candlepower in stop lamps cannot be deferred. No justification has been found for not requiring Class A intensity for motorcycle stop lamps. The standard is therefore being amended as proposed, with clarifying provisions for multiple compartment stop lamps.

(g) It was proposed that motorcycles should be equipped with turn-signal lamps, that there be a maximum candlepower limitation on amber rear-mounted lamps, and that minimum photometric output of head and tail lamps at engine idle speeds should be specified.

Several comments objected to the maximum candlepower proposal and the mounting requirements specified in the proposed Table IV. Also, comments indicated potential problems if minimum photometric output were specified, suggesting instead reference to SAE Recommended Practice J392, "Motorcycle and Motor Driven Cycle Electrical System Maintenance of Design Voltage", December 1969.

Glare candlepower tests on signal lamps installed on the rear of motor vehicles have consistently indicated that a specification in excess of 300 candlepower for both red and amber

lamps is not desirable. A manufacturer encountering problems of exceeding this maximum with amber lamps has the option of using red lamps, which have a lower minimum required candlepower.

The detection and interpretation of turn signal lamps improves as they are mounted farther away from the centerline of the vehicle and from other lamps. Some motorcycle manufacturers, recognizing this fact, have installed the turn signal lamps in the ends of the handlebars, exceeding the requirements adopted in the amendment. The mounting requirements for these lamps specified in Table IV are considered reasonable and practicable for motorcycles.

The standard is being amended as proposed, except that minimum photometric output of headlamps and taillamps at engine idle speeds is not specified. Minimum photometrics are currently being studied for further rulemaking. Since an incorporation by reference to SAE Recommended Practice J392 was not proposed, it is beyond the scope of this rulemaking to incorporate it in the amendment.

(h) Aging and weathering requirements for plastic materials used for optical parts are specified. Although the comments generally supported this revision, many requested a more realistic test than continuous operation of stop and backup lamps in an oven for 1 hour to determine lens warpage. Accordingly, the amendment requires a cycle of operation of 10 minutes' duration followed by 10 minutes' rest during the 1 hour test. Comments suggesting extending the 2-year outdoor exposure test to 3 years and additional oven test details were beyond the scope of the proposal, and will be considered in future rulemaking actions.

(i) As proposed, the words "it is recommended that," "recommendations," or "should be" appearing in any referenced and subreferenced SAE standard shall be read as setting forth mandatory requirements, with minor exceptions covering certain aspects of school bus warning lamps.

(j) Specific tolerances for mounting lamps and reflectors "as far apart as practicable" were proposed, but have not been adopted.

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The standard is being amended as proposed, except that minimum photometric output of headlamps and taillamps at engine idle speeds is not specified. Minimum photometrics are currently being studied for further rulemaking. Since an incorporation by reference to SAE Recommended Practice J392 was not proposed, it is beyond the scope of this rulemaking to incorporate it in the amendment.

(h) Aging and weathering requirements for plastic materials used for optical parts are specified. Although the comments generally supported this revision, many requested a more realistic test than continuous operation of stop and backup lamps in an oven for 1 hour to determine lens warpage. Accordingly, the amendment requires a cycle of operation of 10 minutes' duration followed by 10 minutes' rest during the 1 hour test. Comments suggesting extending the 2-year outdoor exposure test to 3 years and additional oven test details were beyond the scope of the proposal, and will be considered in future rulemaking actions.

(i) As proposed, the words "it is recommended that," "recommendations," or "should be" appearing in any referenced and subreferenced SAE standard shall be read as setting forth mandatory requirements, with minor exceptions covering certain aspects of school bus warning lamps.

(j) Specific tolerances for mounting lamps and reflectors "as far apart as practicable" were proposed, but have not been adopted.

Several comments recommended adopting the ISO (International Standards Organization) requirements that lamps and reflectors be mounted within 16 inches of the edge of the vehicle. Others stated that the Bureau did not have the authority to establish tolerances.

Vehicles having lamps located in conformance with ISO regulations may create problems of distance judgment resulting in driver error. Lamps could be mounted in a range from a minimum of 25 inches apart on small imported passenger cars to a maximum of 74 inches apart on standard domestic cars.

The location of lamps and reflectors is clearly safety related, as it facilitates clearance and distance estimation, detection of signals, and similar functions. The Bureau therefore has the authority to establish horizontal mounting tolerances, analogous to the vertical tolerances that have already been established.

Major changes in lighting requirements may result in the rulemaking action proceeding under Docket No. 69-19. New requirements such as horizontal mounting tolerances need relatively long leadtimes. Accordingly, this proposal has not been adopted, and the requirement for lamps and reflectors is still that they be located "as far apart as practicable."

(k) Lamps and reflectors must meet specified visibility angles when mounted on the vehicle.

Some comments pointed out that when special equipment such as mirrors and snow plows is mounted on the vehicle visibility and photometric test angles may not be met. The amendment allows compliance with this requirement by means of auxiliary lighting devices.

Items (l) through (o) represents proposals which were adopted:

(l) The axis of side reflex reflectors for the photometric test has been defined.

(m) The minimum mounting height for reflectors mounted on the rear of truck tractor cabs will be 4 inches above the height of the rear tires.

(n) Combination turn signal and hazard warning signal flashers will meet the requirements applicable to each, when tested in sequence. Manufacturers of turn signal and hazard warning signal flashers have commented that economic factors and the current state of the art in manu-

facturing lamps preclude a quality level that would totally eliminate occasional random failures. This condition is reflected in the language in Standard No. 108 that lighting equipment "shall be designed to conform" to the stated requirements. The SAE recognizes the problem by specifying an allowable percentage of failures in SAE Standards J590b, "Automotive Turn signal Flasher," and J945, "Vehicular Hazard Warning Signal Flasher." Such a provision is inappropriate, however, for regulatory purposes. It is doubtful that specific failure allowance in a standard would correspond with the statutory mandate that "No person shall manufacture for sale * * * any motor vehicle or item of motor vehicle equipment * * * unless it is in conformity with [any applicable] standard". (15 U.S.C. 1397(a)(1)). From a practical standpoint, such a provision would tend to make the requirement unenforceable except in extreme cases, since failures within a single lot are statistically inconclusive in determining the extent of failures in overall production. Therefore the sampling provisions of the two SAE Standards, originally incorporated by reference in Standard No. 108, are expressly omitted from the standard in this issuance. The omission should not cause a hardship, since the "designed to conform" language has been retained.

(o) SAE Recommended Practice J565b, "Semi-Automatic Headlamp Beam Switching Devices", has replaced J565a as the basic reference for this item of lighting equipment.

(p) It was proposed that all vehicles be equipped with a turn signal pilot indicator, and that those vehicles not equipped to tow trailers (i.e. vehicles with a fixed load flasher) be provided with a lamp failure indicator.

If visible to the rider, motorcycle front turn signal lamps can serve as the pilot indicator, as permitted in SAE Standard J588d, "Turn Signal Lamps".

Many comments objected to the proposal for a lamp failure indicator on vehicles 80 inches or more in overall width. Heavy-duty flashers used on these vehicles are not presently available with a failure indicator. However, this type flasher is considerably more durable than the fixed-load type, used on vehicles of lesser width, which in-

icates a lamp failure, and the continued use of present heavy-duty flashers for wider vehicles is warranted. Also, vehicles of 80 inches or more overall width are generally used commercially, and many of them are subject to the regulations of the Bureau of Motor Carrier Safety of the Federal Highway Administration; such vehicles are more frequently inspected and failed lamps more promptly repaired. For the foregoing reasons, vehicles of 80 or more inches overall width are excluded from the requirement in the amended standard for a turn signal lamp failure indicator.

(q) As proposed, on vehicles less than 80 inches in overall width, license plate lamps and side marker lamps must be on when the headlamps are on, and the taillamps, license plate lamps, and side marker lamps when the parking lamps are on.

(r) No lamps that are normally steady-burning will be allowed to flash automatically for signaling purposes, except headlamps and side marker lamps.

Some commenters requested that additional lamps be permitted to flash, and some requested that flashing headlamps be prohibited.

With the exception of certain signals such as turn signals, hazard warning, and schoolbus warning signals, flashing lamps should be reserved for emergency and road-maintenance-type vehicles. Flashing lamps are otherwise prohibited in the Uniform Vehicle Code. Any lamp may be flashed by the vehicle driver by merely turning the standard lamp switch on and off, and this standard cannot prohibit such operation. However, the definition of "flash" adopted in the amendment makes clear that automatic flashers for use with steady burning lamps other than headlamps and side marker lamps are prohibited.

(s) SAE Standard J593c, "Backup Lamps", has replaced J592b as the basic reference for these lamps. The clarification is made that the center of the backup lamp lens is the optical center. However, because of the leadtime that will be required for manufacturers to alter their designs, good cause is considered shown for an effective date of January 1, 1973.

(t) Headlamp mountings will be required to meet SAE Recommended Practice J566, "Head-

amp Mountings". Although some comments suggested that this was a redundant requirement, it has been determined that this set of requirements contains important safety elements such as requiring lateral adjustability of motorcycle headlamps, adjustability of all headlamps by one man with ordinary tools, and that the aim will not be disturbed under ordinary conditions of service, matters that are not dealt with elsewhere in Standard No. 108.

(u) Turn signal operating units must be capable of meeting a durability test of 100,000 cycles. Most of the comments stated that the 175,000-cycle durability test proposed for passenger cars would be difficult to meet and recommended that SAE Standard J589a be referenced instead of J589. Since J589a includes other changes that were not proposed (temperature test, durability test cycle rate, and ambient temperature), it is beyond the scope of this rule-making to incorporate it by reference in the amended standard. However, a 100,000-cycle durability test has been adopted, as specified in J589a.

(v) The mounting requirements for clearance lamps have been amended to indicate that delineating overall vehicle width, rather than vehicle height, is the primary purpose of these lamps, and a clarification has been added that clearance lamps on truck tractors may be mounted so as to indicate the width of the cab.

(w) Identification lamps must be mounted as high as practicable, and the maximum permissible spacing between the lamps has been reduced from 12 inches to 8 inches.

Objections to these requirements were received primarily because the reduced spacing would create mounting problems due to interference with functional hardware, such as air conditioners and door locking mechanisms. The 8-inch maximum spacing has been adopted, but spacing 6 to 12 inches apart is allowed when 8-inch maximum spacing is not practicable.

(x) License plate lamps must illuminate the plate from the top or sides only.

This is a standard practice with domestic vehicle manufacturers, but not with foreign ones. Foreign manufacturers objected because of inadequate leadtime, and the proposal has been

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adopted with an effective date of January 1, 1978.

(y) A maximum mounting height of 72 inches is specified for turn signal lamps.

Objections were received from manufacturers of cab-over-engine trucks and of snow removal equipment who commented that such a requirement would restrict turn signal placement. However, since no exceptions are specified for headlamp mounting (24-54 inches), none are considered necessary for turn signal lamps (15-72 inches) for these vehicles.

Other comments suggested revisions to the standard that went beyond the scope of the proposal. Those that appear to have merit will be considered in future rulemaking actions.

In consideration of the foregoing, 49 CFR 571.21, Federal Motor Vehicle Safety Standard No. 108, Lamps, Reflective Devices, and Associated Equipment, is amended to read as set forth below.

Effective date: July 1, 1971, except as otherwise noted in the text of the rule.

Issued on October 22, 1970.

Douglas W. Toms,
Director,
National Highway Safety Bureau.

35 F.R. 16840
October 31, 1970

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PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, Buses, Trailers and Motorcycles

(Docket No. 69-18)

Motor Vehicle Safety Standard No. 108, establishing requirements for lamps, reflective devices, and associated equipment on motor vehicles was amended on October 31, 1970 (35 F.R. 16840). Thereafter, pursuant to 49 CFR 553.35 (35 F.R. 5119) petitions for reconsideration of the amendment were filed by Freightliner Corp., Ford Motor Co., Japan Automobile Manufacturers Association, Inc., Wagner Electric Corp., General Motors Corp., Chrysler Corp., Rohm and Haas Co., Motor Coach Industries, International Harvester Co., and Motorcycle Industry Council, Inc. The petitions of Harley-Davidson Motor Co., Inc., Kawasaki Motors Corp., White Motor Corp., Hackney Bros. Body Co., and a supplement to the Japan AMA petition were not timely filed, and have been treated as petitions for rulemaking pursuant to 49 CFR 553.31. However, some of the issues raised in these petitions are similar to those contained in timely filed petitions.

In response to information contained in several of the petitions the standard is being amended. The Administrator has declined to grant requested relief from other requirements of the standard.

1. *Effective date.* General Motors, Ford, and Chrysler have petitioned for an extension of the effective date, stating that compliance is impracticable for 1971 models which, as of July 1, 1971, have only a short production life before the end of the model run. The Bureau has determined therefore that an effective date later than 1 year from issuance of the original amendment is in the public interest. The effective date of the standard is extended to January 1, 1972.

2. *Paragraph S4.1.1.7.* This paragraph is being amended to clarify that its stop lamp requirement does not apply to passenger cars manufactured before January 1, 1973, and to correctly cite SAE Standard J588d, "Turn Signal Lamps," June 1966, as the standard incorporated by reference.

3. *Paragraph S4.1.1.14.* The amendment inadvertently omitted installation requirements for backup lamps. This paragraph is hereby amended to correct the omission, and to insure that current installation requirements remain in effect until January 1, 1973.

4. *Paragraph S4.1.1.16.* Japan AMA and Motorcycle Industry Council objected to the portion of this paragraph that would require motorcycles, as of January 1, 1973, to be equipped with turn-signal units designed to complete a durability test of 100,000 cycles. In order to allow time for further industry study and comment on this aspect of performance, the requirement is withdrawn from the standard. It is anticipated, however, that an increased durability test cycle for motorcycle turn-signals will be proposed in a future rulemaking action.

5. *Paragraph S4.1.2.* Ford, Chrysler, and Rohm and Haas petitioned for reduction of the heat test cycle of the warpage test from 10 to 5 minutes or, in the alternative for an extension of the effective date of this requirement. The Traffic Safety Administration has determined that the 10-minute cycle is appropriate because of the frequency of usage of stop and backup lamps. The petitions for reduction of the test cycle are therefore denied. However, because of the leadtime for development and tooling of new

lamps which may be required, good cause is considered shown for postponement of the effective date for this requirement until January 1, 1973.

6. *Paragraph S4.3.1.8 and Table II.* General Motors, Motor Coach Industries, and International Harvester objected to the reduction in the maximum allowable spacing of identification lamps (from 6 to 12 inches, to 6 to 8 inches), alleging that there is no safety justification for the requirement, and that compliance by July 1, 1971, is impracticable. It is recognized that other approaches to wide-vehicle identification, such as minimum spacing between identification and clearance lamps, have merit. These approaches are being considered and, as deemed appropriate, will be incorporated into future rulemaking proposals. Accordingly, the petitions are granted; Table II is amended to reinstate the 6 to 12 inch spacing, and S4.3.1.8 is deleted.

7. *Paragraph S4.4.2 and Tables I and III.* Wagner Electric petitioned for reconsideration of the omission of sampling provisions from SAE Standard J590b, "Turn-Signal Units," October 1965, and SAE Standard J945, "Vehicular Hazard Warning Unit," February 1966. Letters have also been received inquiring as to the number of flashers constituting a sample for test and the number of failures allowable for compliance. Standard No. 108 was amended without notice to omit sampling provisions in order to bring the standard into conformity with the National Traffic and Motor Vehicle Safety Act of 1966, which requires that all items conform to applicable standards. Therefore the safety standards should not specify sampling provisions or failure rates. It is the manufacturer's responsibility to institute a test program that is sufficient to legally constitute due care, on a continuing basis, to insure that all products manufactured after the effective date of a standard meet the applicable requirements. However, in response to the procedural objection that the change is important enough to merit notice and opportunity for comment, Wagner's petition is granted and paragraph S4.4.2 and Tables I and III are being amended to strike the language precluding sampling provisions. At the same time, this agency is publishing today a notice (Docket No. 69-18; Notice 3, 36 F.R. 1913) pro-

posing omission of sampling provisions as of January 1, 1972, the date when this omission would otherwise have been effective.

8. *Paragraph S4.5.6.* International Harvester asked that the exemption for lamp outage indication be extended to vehicles equipped with auxiliary lamps or wiring, since these vehicles, like vehicles equipped to tow trailers, use variable load flashers. However, fixed load flashers providing lamp outage indication are available on the market for the increased load of an auxiliary lamp. The manufacturer can provide the appropriate flasher with foreknowledge of the intended end configuration of the vehicle, and International Harvester's petition is therefore denied.

9. *Tables II and IV.* Freightliner, International Harvester, and White Motor requested that the maximum mounting height allowable for turn-signal units, 72 inches, be reconsidered. This agency believes that most turn-signal lamps are presently mounted at or below the height of 72 inches, and that no detriment to motor vehicle safety would occur if the maximum mounting height were increased to 83 inches to allow higher mounting of turn-signals on cab-over-engine trucks, snow removal equipment, and other vehicles where a lower height may be impracticable. Tables II and IV are being revised accordingly. In Table IV the word "rear" was inadvertently omitted in that position of Column 2 establishing location requirements for side reflex reflectors, and has been reinserted.

10. *Table III.* Motorcycle Industry Council recommended that SAE Standard J584a, "Motorcycle and Motor Driven Cycle Headlamps," October 1969, be incorporated by reference rather than SAE Standard J584, April 1964. Such an amendment is beyond the scope of the original rulemaking proposal. Reference of the upgraded SAE Standard is being considered for a future rulemaking action. The petition is denied.

In addition, General Motors, Japan AMA, Motorcycle Industry Council, Harley-Davidson, and Kawasaki objected that the 300 candlepower limitation on motorcycle amber rear turn signals is unduly restrictive. Motorcycle Industry Council, Harley-Davidson, and Kawasaki objected to the spacing requirements for motorcycle

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, Buses, Trailers and Motorcycles

(Docket No. 69-18)

Motor Vehicle Safety Standard No. 108, establishing requirements for lamps, reflective devices, and associated equipment on motor vehicles was amended on October 31, 1970 (35 F.R. 16840). Thereafter, pursuant to 49 CFR 553.35 (35 F.R. 5119) petitions for reconsideration of the amendment were filed by Freightliner Corp., Ford Motor Co., Japan Automobile Manufacturers Association, Inc., Wagner Electric Corp., General Motors Corp., Chrysler Corp., Rohm and Haas Co., Motor Coach Industries, International Harvester Co., and Motorcycle Industry Council, Inc. The petitions of Harley-Davidson Motor Co., Inc., Kawasaki Motors Corp., White Motor Corp., Hackney Bros. Body Co., and a supplement to the Japan AMA petition were not timely filed, and have been treated as petitions for rulemaking pursuant to 49 CFR 553.31. However, some of the issues raised in these petitions are similar to those contained in timely filed petitions.

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Effective date: January 1, 1972, except as otherwise noted in the text of the rule.

Issued on January 28, 1971.

Charles H. Hartman,
Acting Administrator, National Highway Traffic Safety Administration.

36 F.R. 1896
February 3, 1971

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PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, Buses, Trailers and Motorcycles (Docket No. 69-18)

This notice amends Motor Vehicle Safety Standard No. 108 to delete the 300-candlepower limitation on motorcycle amber rear turn signals, to adopt an interlamp spacing of 9 inches for motorcycle rear turn signal lamps, and to extend to January 1, 1973, the effective date by which passenger cars and vehicles less than 80 inches in overall width must be manufactured with self-canceling turn-signal units.

In response to petitions for reconsideration of Motor Vehicle Safety Standard No. 108 (35 F.R. 16840), certain amendments to the standard were published on February 3, 1971 (36 F.R. 1896). Action was deferred on other petitions pending further reconsideration. The National Highway Traffic Safety Administration has concluded its review of these petitions and is further amending Standard No. 108. General Motors, Japan Automobile Manufacturers Association, Inc., and Kawasaki Motors Corp. objected that the 300-candlepower limitation on motorcycle amber rear turn signals is unduly restrictive. Since the candlepower limitation would not have become effective until January 1, 1973, and since the Administration has not proposed similar restrictions on amber rear turn signals for other motor vehicles, these petitions are granted, and S4.1.1.11 is deleted. The NHTSA will address the overall problem of candlepower limitations, along with that of rear turn signal color, in a proposal currently under formulation.

Motorcycle Industry Council, Harley-Davidson, and Kawasaki objected to the spacing requirements for motorcycle turn signal lamps and requested that the spacing recommended by the SAE, 9 inches front and rear, be adopted instead. The Administration has decided to grant

the petitions insofar as they concern spacing of rear turn signals. Petitioners are concerned about the durability and injury potential of turn signal lamps spaced 12 inches apart at the rear of a motorcycle. While it appears true that wider spacing of turn signals at the rear create a greater likelihood of damage to the units should the motorcycle fall, this is not considered significant justification for spacing less than 12 inches. Rather, the crash injury problem appears of greater importance. While spacing of rear turn signal lamps at 12 inches does not appear to present a significant injury threat to pedestrians, it may present a hazard to operators and passengers when the vehicle is involved in a collision or falls over. This agency intends to evaluate motorcycle rear turn signal lamp spacing for injury potential in its motorcycle crash injury research program for the current fiscal year, and to reinstate the 12-inch requirement if such spacing does not appear to present a significant potential hazard. Table IV is hereby amended to specify 9 inches as the minimum horizontal separation distance for motorcycle turn signal lamps at the rear.

The motorcycle industry has also expressed its concern about the durability and injury potential of front turn signal lamps spaced 16 inches apart, as well as whether the spacing is justified by available data. Tests conducted by the Road Research Laboratory and SAE provide adequate support, not only for the 16-inch spacing at the front but also for the 12-inch spacing at the rear. Since front turn signal lamps are generally protected by handlebars and durability and injury potential do not appear to be significant, the Administration has decided to retain the 16-

Effective: January 1, 1972
(Except as noted in the Rule)

inch spacing for motorcycle front turn signal lamps.

In addition, Citroen has brought to the attention of the Administration the fact that its vehicles exported to the United States are not equipped with, and are not currently designed to be equipped with, self-canceling turn signals. Because of the modifications required in the panel control, dashboard, and steering column, it avers that it cannot comply until January 1, 1973, and has petitioned that the effective date of S4.1.1.5 be extended. Since virtually all other motor vehicle manufacturers presently comply with this requirement, the granting of this petition would not cause a significant degradation of motor vehicle safety, and S4.1.1.5 is amended accordingly.

Finally, the word "red" inadvertently was included in the first sentence of S4.1.1.7 and is hereby deleted.

In consideration of the foregoing, § 571.21 is amended as follows:

1. S4.1.1.5 is amended to read:

S4.1.1.5 The turn signal operating unit on each passenger car, and multipurpose passenger

vehicle, truck, and bus less than 80 inches in overall width manufactured on or after January 1, 1973, shall be self-canceling by steering wheel rotation and capable of cancellation by a manually operated control.

2. In S4.1.1.7 the word "red" appearing between "Class A" and "turn signal lamps" is deleted.

3. S4.1.1.11 is deleted, in S4.1.1 the reference to "S4.1.1.16" is changed to "S4.1.1.15," and S4.1.1.12, S4.1.1.13, S4.1.1.14, S4.1.1.15, and S4.1.1.16 are renumbered S4.1.1.11, S4.1.1.12, S4.1.1.13, S4.1.1.14, and S4.1.1.15 respectively.

4. In Table IV, under Motorcycles Column 3 for turn signal lamps, the dimension "2 inches" for turn signals at or near the rear is changed to "9 inches."

Effective date: January 1, 1972.

Issued on May 13, 1971.

Douglas W. Toms,
Acting Administrator.

36 F.R. 9069
May 19, 1971

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, Buses, Trailers and Motorcycles (Docket No. 69-18)

This notice amends Motor Vehicle Safety Standard No. 108 to delete the 300-candlepower limitation on motorcycle amber rear turn signals, to adopt an interlamp spacing of 9 inches for motorcycle rear turn signal lamps, and to extend to January 1, 1973, the effective date by which passenger cars and vehicles less than 80 inches in overall width must be manufactured with self-canceling turn-signal units.

In response to petitions for reconsideration of Motor Vehicle Safety Standard No. 108 (35 F.R. 16840), certain amendments to the standard were published on February 3, 1971 (36 F.R. 1896). Action was deferred on other petitions pending further reconsideration. The National Highway Traffic Safety Administration has concluded its review of these petitions and is further amending Standard No. 108. General Motors, Japan Automobile Manufacturers Association, Inc., and Kawasaki Motors Corp. objected that the 300-candlepower limitation on motorcycle amber rear turn signals is unduly restrictive. Since the candlepower limitation would not have become effective until January 1, 1973, and since the Administration has not proposed similar restrictions on amber rear turn signals for other motor vehicles, these petitions are granted, and S4.1.1.11 is deleted. The NHTSA will address the overall problem of candlepower limitations, along with that of rear turn signal color, in a proposal currently under formulation.

Motorcycle Industry Council, Harley-Davidson, and Kawasaki objected to the spacing requirements for motorcycle turn signal lamps and requested that the spacing recommended by the SAE, 9 inches front and rear, be adopted instead. The Administration has decided to grant

the petitions insofar as they concern spacing of rear turn signals. Petitioners are concerned about the durability and injury potential of turn signal lamps spaced 12 inches apart at the rear of a motorcycle. While it appears true that wider spacing of turn signals at the rear create a greater likelihood of damage to the units should the motorcycle fall, this is not considered significant justification for spacing less than 12 inches. Rather, the crash injury problem appears of greater importance. While spacing of rear turn signal lamps at 12 inches does not appear to present a significant injury threat to pedestrians, it may present a hazard to operators and passengers when the vehicle is involved in a collision or falls over. This agency intends to evaluate motorcycle rear turn signal lamp spacing for injury potential in its motorcycle crash injury research program for the current fiscal year, and to reinstate the 12-inch requirement if such spacing does not appear to present a significant potential hazard. Table IV is hereby amended to specify 9 inches as the minimum horizontal separation distance for motorcycle turn signal lamps at the rear.

The motorcycle industry has also expressed its concern about the durability and injury potential of front turn signal lamps spaced 16 inches apart, as well as whether the spacing is justified by available data. Tests conducted by the Road Research Laboratory and SAE provide adequate support, not only for the 16-inch spacing at the front but also for the 12-inch spacing at the rear. Since front turn signal lamps are generally protected by handlebars and durability and injury potential do not appear to be significant, the Administration has decided to retain the 16-

Effective: January 1, 1972
(Except as noted in the Rule)

inch spacing for motorcycle front turn signal lamps.

In addition, Citroen has brought to the attention of the Administration the fact that its vehicles exported to the United States are not equipped with, and are not currently designed to be equipped with, self-canceling turn signals. Because of the modifications required in the panel control, dashboard, and steering column, it avers that it cannot comply until January 1, 1973, and has petitioned that the effective date of S4.1.1.5 be extended. Since virtually all other motor vehicle manufacturers presently comply with this requirement, the granting of this petition would not cause a significant degradation of motor vehicle safety, and S4.1.1.5 is amended accordingly.

Finally, the word "red" inadvertently was included in the first sentence of S4.1.1.7 and is hereby deleted.

In consideration of the foregoing, § 571.21 is amended as follows:

1. S4.1.1.5 is amended to read:

S4.1.1.5 The turn signal operating unit on each passenger car, and multipurpose passenger

vehicle, truck, and bus less than 80 inches in overall width manufactured on or after January 1, 1973, shall be self-canceling by steering wheel rotation and capable of cancellation by a manually operated control.

2. In S4.1.1.7 the word "red" appearing between "Class A" and "turn signal lamps" is deleted.

3. S4.1.1.11 is deleted, in S4.1.1 the reference to "S4.1.1.16" is changed to "S4.1.1.15," and S4.1.1.12, S4.1.1.13, S4.1.1.14, S4.1.1.15, and S4.1.1.16 are renumbered S4.1.1.11, S4.1.1.12, S4.1.1.13, S4.1.1.14, and S4.1.1.15 respectively.

4. In Table IV, under Motorcycles Column 3 for turn signal lamps, the dimension "2 inches" for turn signals at or near the rear is changed to "9 inches."

Effective date: January 1, 1972.

Issued on May 13, 1971.

Douglas W. Toms,
Acting Administrator.

36 F.R. 9069
May 19, 1971

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108
Lamps, Reflective Devices, and Associated Equipment—Passenger Cars, Multipurpose
Passenger Vehicles, Trucks, Buses, Trailers and Motorcycles
(Docket No. 69-18)

The purpose of this notice is to amend Motor Vehicle Safety Standard No. 108 to delete sampling and failure-rate provisions from the tests of turn signal and hazard warning signal flashers, and to modify performance requirements for these items of motor vehicle equipment.

The notice of proposed rulemaking upon which this amendment is based was published in the *Federal Register* on February 3, 1971 (36 F.R. 1913). Standard No. 108 incorporates by reference SAE Standard J590b, "Automotive Turn Signal Flasher," October 1965, and SAE Recommended Practice J945, "Vehicular Hazard Warning Signal Flasher," February 1966. Both standards specify a test sample size and a permissible failure rate for the items tested; viz., that 50 items shall be "submitted for test," that 20 items shall be chosen from the 50, and that "at least 17 out of 20 samples" shall meet the requirements. These are the provisions whose deletion was proposed.

Careful consideration has been given to the comments received in response to the notice. Many industry comments opposed the proposal, alleging that substantially total compliance would necessitate an increase in unit cost, and arguing that the cost increase is not justified by the safety benefits to be gained. Concern was also expressed as to possible penalties that might arise from the occasional failures that are claimed by the industry to be unavoidable in items of this type.

As stated in the February 3 notice of proposed rulemaking, the NHTSA considers permissible failure rates to be contrary to both the letter and the intent of the National Traffic and Motor Vehicle Safety Act. Manufacturers are required

to use due care to ensure that all their products meet the requirements of the standards. The assessment of penalties for test failures is not automatic, however, but is made after a review of all the facts, with a view to determining whether due care was used in accordance with sound engineering and manufacturing principles. The sampling and failure-rate provisions are accordingly hereby deleted from the requirements in Standard No. 108 for turn signal and hazard warning signal flashers.

The NHTSA has determined that the design and production problems associated with the manufacture of thermal flashers are such that total compliance with current performance and durability test requirements is not practicable. Therefore, modifications have been made in starting time, voltage drop, flash rate and percent current "on" time for performance tests, and in the duration and cycle of operation for durability tests. For example, the previously required performance range of 60 to 120 flashes per minute is broadened to 40 to 140 flashes per minute, and the percentage of time during a flash cycle that flasher contacts are required to be engaged, previously a range of 30 percent to 75 percent, is now 25 percent to 80 percent. The durability test for turn signal flashers will be continuous for 25 hours, rather than consisting of an on-off cycle for 200 hours. The durability test for hazard warning signal flashers is reduced to 12 hours from 36 hours. This agency has concluded that the net effect of these modifications is not a lessening of motor vehicle safety, since the minimum performance of flashers is substantially upgraded by requiring compliance of every flasher manufactured, rather than of only 17 of every 20 tested.

Effective: January 1, 1973

To implement the deletion of sampling and failure-rate provisions and the modification of the previous requirements, the NHTSA is amending Standard No. 108 to delete existing references to SAE Standard J590b and SAE Recommended Practice J945, and to adopt a new paragraph S4.6, *Turn signal flashers; hazard warning signal flashers*, that incorporates the new requirements.

In consideration of the foregoing, 49 CFR 571.21, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices and Associated Equipment*, is amended. . . .

Effective date: January 1, 1973. Manufacturers commented that the proposed effective date

of January 1, 1972, was impracticable in view of the necessity to evaluate and adopt new flasher and switch designs meeting the requirements. In light of the time needed for changes in design and preparation for production, the Administrator has found, for good cause shown, that an effective date later than one year from the date of issuance is in the public interest.

Issued on August 20, 1971.

Charles H. Hartman
Acting Administrator

36 F.R. 17343
August 28, 1971

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108
Lamps, Reflective Devices, and Associated Equipment—Passenger Cars, Multipurpose
Passenger Vehicles, Trucks, Buses, Trailers and Motorcycles
(Docket No. 69-18)

The purpose of this notice is to amend Motor Vehicle Safety Standard No. 108 to delete sampling and failure-rate provisions from the tests of turn signal and hazard warning signal flashers, and to modify performance requirements for these items of motor vehicle equipment.

The notice of proposed rulemaking upon which this amendment is based was published in the *Federal Register* on February 3, 1971 (36 F.R. 1913). Standard No. 108 incorporates by reference SAE Standard J590b, "Automotive Turn Signal Flasher," October 1965, and SAE Recommended Practice J945, "Vehicular Hazard Warning Signal Flasher," February 1966. Both standards specify a test sample size and a permissible failure rate for the items tested, viz., that 50 items shall be "submitted for test," that 20 items shall be chosen from the 50, and that "at least 17 out of 20 samples" shall meet the requirements. These are the provisions whose deletion was proposed.

Careful consideration has been given to the comments received in response to the notice. Many industry comments opposed the proposal, alleging that substantially total compliance would necessitate an increase in unit cost, and arguing that the cost increase is not justified by the safety benefits to be gained. Concern was also expressed as to possible penalties that might arise from the occasional failures that are claimed by the industry to be unavoidable in items of this type.

As stated in the February 3 notice of proposed rulemaking, the NHTSA considers permissible failure rates to be contrary to both the letter and the intent of the National Traffic and Motor Vehicle Safety Act. Manufacturers are required

to use due care to ensure that all their products meet the requirements of the standards. The assessment of penalties for test failures is not automatic, however, but is made after a review of all the facts, with a view to determining whether due care was used in accordance with sound engineering and manufacturing principles. The sampling and failure-rate provisions are accordingly hereby deleted from the requirements in Standard No. 108 for turn signal and hazard warning signal flashers.

The NHTSA has determined that the design and production problems associated with the manufacture of thermal flashers are such that total compliance with current performance and durability test requirements is not practicable. Therefore, modifications have been made in starting time, voltage drop, flash rate and percent current "on" time for performance tests, and in the duration and cycle of operation for durability tests. For example, the previously required performance range of 60 to 120 flashes per minute is broadened to 40 to 140 flashes per minute, and the percentage of time during a flash cycle that flasher contacts are required to be engaged, previously a range of 30 percent to 75 percent, is now 25 percent to 80 percent. The durability test for turn signal flashers will be continuous for 25 hours, rather than consisting of an on-off cycle for 200 hours. The durability test for hazard warning signal flashers is reduced to 12 hours from 36 hours. This agency has concluded that the net effect of these modifications is not a lessening of motor vehicle safety, since the minimum performance of flashers is substantially upgraded by requiring compliance of every flasher manufactured, rather than of only 17 of every 20 tested.

Effective: January 1, 1973

To implement the deletion of sampling and failure-rate provisions and the modification of the previous requirements, the NHTSA is amending Standard No. 108 to delete existing references to SAE Standard J590b and SAE Recommended Practice J945, and to adopt a new paragraph S4.6, *Turn signal flashers; hazard warning signal flashers*, that incorporates the new requirements.

In consideration of the foregoing, 49 CFR 571.21, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices and Associated Equipment*, is amended. . . .

Effective date: January 1, 1973. Manufacturers commented that the proposed effective date

of January 1, 1972, was impracticable in view of the necessity to evaluate and adopt new flasher and switch designs meeting the requirements. In light of the time needed for changes in design and preparation for production, the Administrator has found, for good cause shown, that an effective date later than one year from the date of issuance is in the public interest.

Issued on August 20, 1971.

Charles H. Hartman
Acting Administrator

36 F.R. 17343
August 28, 1971

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices and Associated Equipment

(Docket No. 69-18; Notice 6)

Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, was amended on August 28, 1971 (36 F.R. 17343) to revise performance requirements for turn signal and hazard warning signal flashers. Thereafter petitions for reconsideration of the amendment were filed by Chrysler Corporation, Ideal Corporation, Signal-Stat Corporation, and Stewart-Warner Corporation. This notice responds to these petitions. This notice also amends Standard No. 108 to allow compliance with paragraph S4.6 of Standard No. 108a (§ 571.108a), at the option of the manufacturer, before January 1, 1973.

In its petition for reconsideration, Chrysler noted that "the amendment deletes the sampling provision and imposes new, presumably less stringent, but unique performance requirements" and commented that "while this change was announced in principle in prior rulemaking actions, the details of the new performance requirements were specified for the first time in this amendment." Claiming that its suppliers have not had time to evaluate their ability to comply with the new requirements, Chrysler petitioned that the amendment be withdrawn and reissued as a notice of proposed rulemaking. Sampling and failure-rate provisions were initially deleted in a rule published October 31, 1970 (35 F.R. 16840), which amended Standard No. 108 in various ways. Then, in response to objections that the action had not been previously the subject of a notice of proposed rulemaking, the action was revoked, a new notice of proposed rulemaking to that effect was issued on February 3, 1971 (36 F.R. 1913), and all interested persons were given full opportunity to comment. After careful consideration of the comments received, the agency again published a rule on August 28,

1971 (36 F.R. 17343), which deleted the sampling and failure-rate provisions. The rule also relaxed somewhat some of the quantitative levels of required performance. Thereafter, in accordance with the agency procedural rules, petitions for reconsideration of the rule were received and considered. The NHTSA considers that these actions have considerably exceeded the requirements of the Administrative Procedure Act, 5 U.S.C. 553, that notice and opportunity for comment be provided giving "either the terms or substance of the proposed rule or a description of the subjects and issues involved," and finds that no significant further benefit will be gained by reopening the matter for still another round of comments. Chrysler's petition is therefore denied.

Stewart-Warner submitted a general petition for reconsideration of the amendment, believing that "the amendment can allow unsafe conditions to come into existence." While it is true that the new performance requirements, on a strictly quantitative basis, may be viewed as less stringent than the old, the agency has concluded that the net effect of the amendment, considering the removal of the permissible failure rate, is not a lessening of the safety performance of these items.

Signal-Stat and Ideal petitioned that paragraph S4.1.1 be amended to require that all lighting equipment designed to conform to Standard No. 108 be "manufactured in accordance with sound engineering, manufacturing, and quality control principles." The basis for this request, in Signal-Stat's words, is that "while it is not possible to assure the durability of any single individual flasher, it is possible to reasonably produce requirements on a statistical basis in mass production," and that "the only

Effective: January 1, 1972

feasible and practical 'due care' and production means available, dictated by sound quality control principles, is to evaluate devices of volume on a statistical basis." The NHTSA has generally no objection to the above statements, although they are not necessary or appropriate for inclusion in the standard itself. The agency does not have any intent of outlawing designs such as thermal flashers, that have been previously used to satisfy the requirements in question. It also recognizes fully that with high-volume, low-cost items of equipment such as flashers, sample testing by the manufacturer may be the only practicable means of quality control. It can further be stated that in the case of such items, an occasional failure of NHTSA compliance tests, representing a very small percentage of production, will not necessarily result in a determination that there has been a violation of the Act. The question in each case is whether the manufacturer exercised due care; wherever a manufacturer can establish that he has exercised due care, he will not be in violation of the Act. The petitions of Ideal and Signal-Stat are therefore denied.

Ideal has also requested an interpretation that it be allowed to manufacture flashers before January 1, 1973, that conform to the revised requirements. To encourage manufacturers to conform at an early date, the NHTSA is amending Standard No. 108 to allow compliance with

paragraph S4.6 of Standard No. 108a (§ 571.108a), at the option of the manufacturer, between January 1, 1972, and January 1, 1973.

This notice also corrects a paragraph numbering error in both standards.

In consideration of the foregoing, 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, is amended. . . .

Effective date: January 1, 1972. Because the amendments create no additional burden or obligation, and permit an early implementation of revised performance requirements, the Administrator has found for good cause shown that an effective date earlier than one hundred eighty days after issuance of this notice is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on December 22, 1971.

Douglas W. Toms
Administrator

36 F.R. 25013
December 28, 1971

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices and Associated Equipment

(Docket No. 69-18; Notice 6)

Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, was amended on August 28, 1971 (36 F.R. 17343) to revise performance requirements for turn signal and hazard warning signal flashers. Thereafter petitions for reconsideration of the amendment were filed by Chrysler Corporation, Ideal Corporation, Signal-Stat Corporation, and Stewart-Warner Corporation. This notice responds to these petitions. This notice also amends Standard No. 108 to allow compliance with paragraph S4.6 of Standard No. 108a (§ 571.108a), at the option of the manufacturer, before January 1, 1973.

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1971 (36 F.R. 17343), which deleted the sampling and failure-rate provisions. The rule also relaxed somewhat some of the quantitative levels of required performance. Thereafter, in accordance with the agency procedural rules, petitions for reconsideration of the rule were received and considered. The NHTSA considers that these actions have considerably exceeded the requirements of the Administrative Procedure Act, 5 U.S.C. 553, that notice and opportunity for comment be provided giving "either the terms or substance of the proposed rule or a description of the subjects and issues involved," and finds that no significant further benefit will be gained by reopening the matter for still another round of comments. Chrysler's petition is therefore denied.

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Signal-Stat and Ideal petitioned that paragraph S4.1.1 be amended to require that all lighting equipment designed to conform to Standard No. 108 be "manufactured in accordance with sound engineering, manufacturing, and quality control principles." The basis for this request, in Signal-Stat's words, is that "while it is not possible to assure the durability of any single individual flasher, it is possible to reasonably produce requirements on a statistical basis in mass production," and that "the only

Effective: January 1, 1972

feasible and practical 'due care' and production means available, dictated by sound quality control principles, is to evaluate devices of volume on a statistical basis." The NHTSA has generally no objection to the above statements, although they are not necessary or appropriate for inclusion in the standard itself. The agency does not have any intent of outlawing designs such as thermal flashers, that have been previously used to satisfy the requirements in question. It also recognizes fully that with high-volume, low-cost items of equipment such as flashers, sample testing by the manufacturer may be the only practicable means of quality control. It can further be stated that in the case of such items, an occasional failure of NHTSA compliance tests, representing a very small percentage of production, will not necessarily result in a determination that there has been a violation of the Act. The question in each case is whether the manufacturer exercised due care; wherever a manufacturer can establish that he has exercised due care, he will not be in violation of the Act. The petitions of Ideal and Signal-Stat are therefore denied.

Ideal has also requested an interpretation that it be allowed to manufacture flashers before January 1, 1973, that conform to the revised requirements. To encourage manufacturers to conform at an early date, the NHTSA is amending Standard No. 108 to allow compliance with

paragraph S4.6 of Standard No. 108a (§ 571.108a), at the option of the manufacturer, between January 1, 1972, and January 1, 1973.

This notice also corrects a paragraph numbering error in both standards.

In consideration of the foregoing, 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, is amended. . . .

Effective date: January 1, 1972. Because the amendments create no additional burden or obligation, and permit an early implementation of revised performance requirements, the Administrator has found for good cause shown that an effective date earlier than one hundred eighty days after issuance of this notice is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on December 22, 1971.

Douglas W. Toms
Administrator

36 F.R. 25013
December 28, 1971

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment**

(Docket No. 69-18; Notice 7)

The purpose of this notice is to specify a permissible method of certifying replacement lighting equipment for vehicles manufactured on or after January 1, 1972, to conform to Federal Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*.

Section 114 of the National Traffic and Motor Vehicle Safety Act (15 U.S.C. 1403) requires every manufacturer or distributor of motor vehicle equipment to "furnish to the distributor or dealer at the time of delivery of such . . . equipment by such manufacturer or distributor the certification that each such . . . item of motor vehicle equipment conforms to all applicable Federal motor vehicle safety standards . . . [S]uch certification may be in the form of a label or tag on such item or on the outside of a container in which such item is delivered." Thus, manufacturers of equipment to which a safety standard applies generally certify the equipment by labeling either the equipment or its container. In the case of Standard No. 109, *New Pneumatic Tires*, certification labeling on the items themselves is required by the standard.

Normally, the certification responsibility of a distributor is met by the distributor's delivery of the manufacturer's certification statement to the dealers to whom he sells. Although no separate statement is necessary, the delivery of the manufacturer's certification is considered a legal act by which the distributor makes the certification required by the statute.

With the extension of Standard No. 108 to items of replacement equipment, some difficulties in this scheme may arise where small items are not individually packaged. Automotive parts distributors commonly sell single items of equipment "over the counter" to local garagemen, who are dealers within the meaning of the Act. If these items are not separately packaged and not

marked with a certification, the distributor must, under the Act, certify the items to the dealer. Although there is a variety of ways in which the distributor can do this, it is probably unrealistic to expect a separate certification to be properly and consistently made at this level. Manufacturers of lighting equipment have recognized the problem, and have suggested that they be permitted to certify their equipment by affixing the symbol DOT to each item of equipment.

This request has been found to have merit, and S4.7 of Standard No. 108, 49 CFR 571.108, is hereby amended to permit manufacturers to certify lighting equipment items by placing the symbol "DOT" directly on the item, if they choose to do so.

In consideration of the foregoing, S4.7 of 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, is amended. . . .

Effective date: January 12, 1972. Because the amendment creates no additional burden or obligation and permits an optional method of compliance with an existing requirement, the Administrator has found for good cause shown that an immediate effective date is in the public interest.

This notice is issued under the authority of sections 103, 112, 114 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1401, 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on January 6, 1972.

Douglas W. Toms
Administrator

37 F.R. 445

January 12, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment**

(Docket No. 69-18; Notice 7)

The purpose of this notice is to specify a permissible method of certifying replacement lighting equipment for vehicles manufactured on or after January 1, 1972, to conform to Federal Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*.

Section 114 of the National Traffic and Motor Vehicle Safety Act (15 U.S.C. 1403) requires every manufacturer or distributor of motor vehicle equipment to "furnish to the distributor or dealer at the time of delivery of such . . . equipment by such manufacturer or distributor the certification that each such . . . item of motor vehicle equipment conforms to all applicable Federal motor vehicle safety standards . . . [S]uch certification may be in the form of a label or tag on such item or on the outside of a container in which such item is delivered." Thus, manufacturers of equipment to which a safety standard applies generally certify the equipment by labeling either the equipment or its container. In the case of Standard No. 109, *New Pneumatic Tires*, certification labeling on the items themselves is required by the standard.

Normally, the certification responsibility of a distributor is met by the distributor's delivery of the manufacturer's certification statement to the dealers to whom he sells. Although no separate statement is necessary, the delivery of the manufacturer's certification is considered a legal act by which the distributor makes the certification required by the statute.

With the extension of Standard No. 108 to items of replacement equipment, some difficulties in this scheme may arise where small items are not individually packaged. Automotive parts distributors commonly sell single items of equipment "over the counter" to local garagemen, who are dealers within the meaning of the Act. If these items are not separately packaged and not

marked with a certification, the distributor must, under the Act, certify the items to the dealer. Although there is a variety of ways in which the distributor can do this, it is probably unrealistic to expect a separate certification to be properly and consistently made at this level. Manufacturers of lighting equipment have recognized the problem, and have suggested that they be permitted to certify their equipment by affixing the symbol DOT to each item of equipment.

This request has been found to have merit, and S4.7 of Standard No. 108, 49 CFR 571.108, is hereby amended to permit manufacturers to certify lighting equipment items by placing the symbol "DOT" directly on the item, if they choose to do so.

In consideration of the foregoing, S4.7 of 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, is amended. . . .

Effective date: January 12, 1972. Because the amendment creates no additional burden or obligation and permits an optional method of compliance with an existing requirement, the Administrator has found for good cause shown that an immediate effective date is in the public interest.

This notice is issued under the authority of sections 103, 112, 114 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1401, 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on January 6, 1972.

Douglas W. Toms
Administrator

37 F.R. 445

January 12, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 69-18; Notice 8)

This notice amends 49 CFR 571.108 and 571.108a, Motor Vehicle Safety Standard No. 108 and No. 108a, *Lamps, Reflective Devices, and Associated Equipment*, to permit off-center spacing of identification lamps on vehicles 80 inches or more in overall width.

Utility Trailer Manufacturing Co., has petitioned for the reinstatement of former requirements for the location of identification lamps. Before January 1, 1972, the three-lamp cluster was required to be mounted "as close as practicable to the vertical centerline." On vehicles manufactured on or after that date, the three identification lamps must be mounted "one on the vertical centerline, and one on each side of the vertical centerline." A type of trailer manufactured by Utility mounts a lock on the centerline of the trailer with the lock socket at the rear header. Typically the header is shallow and does not allow room to mount the gasket seal, the center lock socket, and an identification lamp all "on the vertical centerline." Extensive retooling is necessary for compliance, and apparently would cause hardship to Utility and other manufacturers of this type of trailer. The Administration believes that permitting the lamp cluster to be mounted slightly off center would not com-

promise motor vehicle safety, and accordingly is returning to the original mounting requirement for all vehicles required to have identification lamps.

In consideration of the foregoing, the specifications for "Identification Lamps" in Table II, Location of Required Equipment, 49 CFR § 571.108, and 49 CFR § 571.108a, are revised. . . .

Effective date: January 25, 1972. Because the amendments create no additional burden or obligation, the Administrator finds for good cause shown that an immediate effective date is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on January 19, 1972.

Douglas W. Toms
Administrator

37 F.R. 1107
January 25, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 69-18; Notice 8)

This notice amends 49 CFR 571.108 and 571.108a, Motor Vehicle Safety Standard No. 108 and No. 108a, *Lamps, Reflective Devices, and Associated Equipment*, to permit off-center spacing of identification lamps on vehicles 80 inches or more in overall width.

Utility Trailer Manufacturing Co., has petitioned for the reinstatement of former requirements for the location of identification lamps. Before January 1, 1972, the three-lamp cluster was required to be mounted "as close as practicable to the vertical centerline." On vehicles manufactured on or after that date, the three identification lamps must be mounted "one on the vertical centerline, and one on each side of the vertical centerline." A type of trailer manufactured by Utility mounts a lock on the centerline of the trailer with the lock socket at the rear header. Typically the header is shallow and does not allow room to mount the gasket seal, the center lock socket, and an identification lamp all "on the vertical centerline." Extensive retooling is necessary for compliance, and apparently would cause hardship to Utility and other manufacturers of this type of trailer. The Administration believes that permitting the lamp cluster to be mounted slightly off center would not com-

promise motor vehicle safety, and accordingly is returning to the original mounting requirement for all vehicles required to have identification lamps.

In consideration of the foregoing, the specifications for "Identification Lamps" in Table II, Location of Required Equipment, 49 CFR § 571.108, and 49 CFR § 571.108a, are revised. . . .

Effective date: January 25, 1972. Because the amendments create no additional burden or obligation, the Administrator finds for good cause shown that an immediate effective date is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on January 19, 1972.

Douglas W. Toms
Administrator

37 F.R. 1107

January 25, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 72-4; Notice 2)

This notice amends 49 CFR § 571.108 and § 571.108a, Motor Vehicle Safety Standard Nos. 108 and 108a, *Lamps, Reflective Devices, and Associated Equipment*, to revise the test method for reflex reflectors.

On April 8, 1972, the National Highway Traffic Safety Administration proposed (37 F.R. 7107) that the applicable SAE standard for reflex reflectors incorporated by reference in Table I and Table III of Standards No. 108 and 108a be SAE Standard J594e, "Reflex Reflectors," March 1970, to replace J594d, March 1967. All comments received were in favor of the proposal and the standards are being amended accordingly. The effect of the amendment is to permit photometric testing at a range around a test point if specular reflection is encountered at the test point itself. The amendment does not impose a new performance requirement but allows a more realistic method of testing than J594d, which prohibited testing at other than the specified test points, and which had the effect of causing a technical noncompliance if there were specular reflection at any test point.

Paragraph S4.3.1.2 has been incorporated into J594e and is being deleted from the text of Standard No. 108a. This paragraph specifies that, for purposes of photometric testing, the

axis of the side reflex reflectors shall be perpendicular to a vertical plane through the longitudinal axis of the vehicle.

In consideration of the foregoing, 49 CFR § 571.108 and § 571.108a, Motor Vehicle Safety Standards 108 and 108a, are revised

Effective date: Standard No. 108: Sep. 1, 1972; Standard No. 108a: January 1, 1973. Because the amendments create no additional burden and modify a test procedure currently in effect, it is found for good cause shown that an effective date earlier than one hundred eighty days after issuance is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on July 28, 1972.

Douglas W. Toms
Administrator

37 F.R. 15514
August 3, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 72-4; Notice 2)

This notice amends 49 CFR § 571.108 and § 571.108a, Motor Vehicle Safety Standard Nos. 108 and 108a, *Lamps, Reflective Devices, and Associated Equipment*, to revise the test method for reflex reflectors.

On April 8, 1972, the National Highway Traffic Safety Administration proposed (37 F.R. 7107) that the applicable SAE standard for reflex reflectors incorporated by reference in Table I and Table III of Standards No. 108 and 108a be SAE Standard J594e, "Reflex Reflectors," March 1970, to replace J594d, March 1967. All comments received were in favor of the proposal and the standards are being amended accordingly. The effect of the amendment is to permit photometric testing at a range around a test point if specular reflection is encountered at the test point itself. The amendment does not impose a new performance requirement but allows a more realistic method of testing than J594d, which prohibited testing at other than the specified test points, and which had the effect of causing a technical noncompliance if there were specular reflection at any test point.

Paragraph S4.3.1.2 has been incorporated into J594e and is being deleted from the text of Standard No. 108a. This paragraph specifies that, for purposes of photometric testing, the

axis of the side reflex reflectors shall be perpendicular to a vertical plane through the longitudinal axis of the vehicle.

In consideration of the foregoing, 49 CFR § 571.108 and § 571.108a, Motor Vehicle Safety Standards 108 and 108a, are revised

Effective date: Standard No. 108: Sep. 1, 1972; Standard No. 108a: January 1, 1973. Because the amendments create no additional burden and modify a test procedure currently in effect, it is found for good cause shown that an effective date earlier than one hundred eighty days after issuance is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on July 28, 1972.

Douglas W. Toms
Administrator

37 F.R. 15514
August 3, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 69-18; Notice 11)

This notice amends 49 CFR Part 571, by revoking Section 571.108a, Motor Vehicle Safety Standard No. 108a, *Lamps, Reflective Devices, and Associated Equipment* and deleting a conforming amendment to Standard No. 108, in accordance with a decision of the U.S. Court of Appeals.

Standard No. 108a was established on December 2, 1971 (36 F.R. 22909), to clarify requirements for turn signal and hazard warning signal flashers effective January 1, 1973. These requirements were established by an amendment published on August 28, 1971 (36 F.R. 13743). The amendment deleted sampling and failure rate provisions from the tests for these items of motor vehicle equipment, and modified the performance requirements.

Pursuant to section 105(a)(1), of the National Traffic and Motor Vehicle Safety Act of 1966 (15 USC 1394(a)(1)), Wagner Electric Corporation petitioned for review of the August 28, 1971 order in the United States Court of Appeals for the Third Circuit. On August 29, 1972, the court granted the petition, set aside the order and remanded the matter to the National Highway Safety Administration for new rulemaking proceedings consistent with the court's views.

(Wagner Electric Corporation v. Volpe, No. 71-1976 (3d Cir. 1972))

By this notice, the NHTSA deletes from the Code of Federal Regulations the amendment set aside by the Court's order. The deleted provision essentially constituted the version of the standard that was to become effective January 1, 1973, (Standard No. 108a) along with paragraph S4.1.1.16 of Standard No. 108, which allowed manufacturers to conform to the new requirements before that date.

In consideration of the foregoing, 49 CFR Part 571 is amended

Effective date: This notice reflects the order of the U.S. Court of Appeals for the Third Circuit, whose mandate was issued September 19, 1972, and is effective as of that date.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority at 49 CFR 1.51.

Issued on September 28, 1972.

Douglas W. Toms
Administrator

37 F.R. 20695
October 3, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 69-18; Notice 11)

This notice amends 49 CFR Part 571, by revoking Section 571.108a, Motor Vehicle Safety Standard No. 108a, *Lamps, Reflective Devices, and Associated Equipment* and deleting a conforming amendment to Standard No. 108, in accordance with a decision of the U.S. Court of Appeals.

Standard No. 108a was established on December 2, 1971 (36 F.R. 22909), to clarify requirements for turn signal and hazard warning signal flashers effective January 1, 1973. These requirements were established by an amendment published on August 28, 1971 (36 F.R. 13743). The amendment deleted sampling and failure rate provisions from the tests for these items of motor vehicle equipment, and modified the performance requirements.

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(Wagner Electric Corporation v. Volpe, No. 71-1976 (3d Cir. 1972))

By this notice, the NHTSA deletes from the Code of Federal Regulations the amendment set aside by the Court's order. The deleted provision essentially constituted the version of the standard that was to become effective January 1, 1973, (Standard No. 108a) along with paragraph S4.1.1.16 of Standard No. 108, which allowed manufacturers to conform to the new requirements before that date.

In consideration of the foregoing, 49 CFR Part 571 is amended

Effective date: This notice reflects the order of the U.S. Court of Appeals for the Third Circuit, whose mandate was issued September 19, 1972, and is effective as of that date.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority at 49 CFR 1.51.

Issued on September 28, 1972.

Douglas W. Toms
Administrator

37 F.R. 20695
October 3, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 71-21; Notice 3)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to modify the method by which conformity of certain lamps to photometric requirements is determined. A notice of proposed rulemaking on this subject was published on November 30, 1971 (36 F.R. 22763).

Standard No. 108 requires that tail lamps, stop lamps, parking lamps, and turn signal lamps meet minimum photometric candlepower requirements at up to 27 individual test points. If a lamp fails to meet the minimum requirement at any test point, the lamp does not conform to Standard No. 108 even though it may exceed the specified minimum at all other test points.

As noted in the November 30, 1971 proposal, this requirement appeared unnecessarily severe, since deviances at individual test points are generally not great enough to be discernible to the human eye. The method proposed and adopted sets up seven groups of test points, as shown in Figure 1, each group containing from three to five test points. The groups include requirements for devices with one, two, or three separately lighted compartments, and multiple lamps used in an array to perform a function at a single design location. The minimum candlepower requirement for any single group is the sum of the minimum candlepower specified in the applicable SAE standards for individual test points within the group. Therefore, there will be no failure to conform to Standard No. 108 as long as the sum of the candlepower measured at all test points within a group equals or exceeds the required minimum figure for that group. The amendment will not have a significant effect on motor vehicle safety and is designed to set up a

more realistic and cost effective method of determining compliance with photometric requirements.

Two aspects of the proposal are not adopted in the amendment. The proposal would have set a floor of 60 per cent on the amount by which the measured candlepower at a single test point could fail to reach the required minimum for that test point. The same rationale governing the overall proposal dictated that the floor not be adopted: as long as the sum of the test points within a group meets the overall minimum for the group, the difference in illumination at any discrete test point is unlikely to be great enough to be discernible.

Secondly, the proposal would have required that clearance, side marker, identification, and parking lamps have minimum candlepower equivalent to tail lamps. This proposal has not been adopted. Comments indicated that the increase in candlepower would be so significantly greater as to cause a glare problem. The group test concept has been adopted for parking lamps, but not for clearance, side marker, identification lamps, which retain minimum candlepower for all test points.

In addition, a deferred effective date has been adopted for increased grouped candlepower requirements applicable to tail, stop and turn signal lamps with two or three lighted compartments, and to lamp arrangements where two or three lamps are used to perform a single function in a single design location. These requirements have been made effective September 1, 1974, in order to provide sufficient leadtime for redesign and retooling. In the interim, beginning January 1, 1973, such lamps or lamp arrangements may meet the grouped requirements applicable to single

Effective: January 1, 1973

compartment and single stop and turn signal lamps.

It was also proposed that minimum candlepower requirements be specified for tail lamps, stop lamps and turn signal lamps, measured at a 45-degree angle where any SAE Standard incorporated by reference required visibility of the lamps at a 45-degree angle. Objections were raised that the proposed values were too high and that there was no safety benefit in requiring them. The NHTSA, on the basis of its analysis of cost benefit factors, has not adopted the proposal.

The amendment does not adopt the proposal that both red and yellow rear turn signal lamps have the same maximum candlepower limitation. The subject of the color of rear turn signal lamps will be addressed in a forthcoming notice, in Docket No. 69-19.

The SAE standard applicable to parking lamps in Table III has been changed to SAE Standard J222, "Parking Lamps (Position Lamps)," December 1970. Paragraph S4.1.1.11, which specifies photometric values for parking lamps, is

deleted as these values are incorporated in the revised SAE standard.

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is revised

Effective date: January 1, 1973. Because the amendment creates no additional burden, it is found for good cause shown that an effective date earlier than one hundred eighty days after issuance is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392 and 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on October 2, 1972.

Douglas W. Toms
Administrator

37 F.R. 21328
October 7, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 71-21; Notice 3)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to modify the method by which conformity of certain lamps to photometric requirements is determined. A notice of proposed rulemaking on this subject was published on November 30, 1971 (36 F.R. 22763).

Standard No. 108 requires that tail lamps, stop lamps, parking lamps, and turn signal lamps meet minimum photometric candlepower requirements at up to 27 individual test points. If a lamp fails to meet the minimum requirement at any test point, the lamp does not conform to Standard No. 108 even though it may exceed the specified minimum at all other test points.

As noted in the November 30, 1971 proposal, this requirement appeared unnecessarily severe, since deviances at individual test points are generally not great enough to be discernible to the human eye. The method proposed and adopted sets up seven groups of test points, as shown in Figure 1, each group containing from three to five test points. The groups include requirements for devices with one, two, or three separately lighted compartments, and multiple lamps used in an array to perform a function at a single design location. The minimum candlepower requirement for any single group is the sum of the minimum candlepower specified in the applicable SAE standards for individual test points within the group. Therefore, there will be no failure to conform to Standard No. 108 as long as the sum of the candlepower measured at all test points within a group equals or exceeds the required minimum figure for that group. The amendment will not have a significant effect on motor vehicle safety and is designed to set up a

more realistic and cost effective method of determining compliance with photometric requirements.

Two aspects of the proposal are not adopted in the amendment. The proposal would have set a floor of 60 per cent on the amount by which the measured candlepower at a single test point could fail to reach the required minimum for that test point. The same rationale governing the overall proposal dictated that the floor not be adopted: as long as the sum of the test points within a group meets the overall minimum for the group, the difference in illumination at any discrete test point is unlikely to be great enough to be discernible.

Secondly, the proposal would have required that clearance, side marker, identification, and parking lamps have minimum candlepower equivalent to tail lamps. This proposal has not been adopted. Comments indicated that the increase in candlepower would be so significantly greater as to cause a glare problem. The group test concept has been adopted for parking lamps, but not for clearance, side marker, identification lamps, which retain minimum candlepower for all test points.

In addition, a deferred effective date has been adopted for increased grouped candlepower requirements applicable to tail, stop and turn signal lamps with two or three lighted compartments, and to lamp arrangements where two or three lamps are used to perform a single function in a single design location. These requirements have been made effective September 1, 1974, in order to provide sufficient leadtime for redesign and retooling. In the interim, beginning January 1, 1973, such lamps or lamp arrangements may meet the grouped requirements applicable to single

Effective: January 1, 1973

compartment and single stop and turn signal lamps.

It was also proposed that minimum candlepower requirements be specified for tail lamps, stop lamps and turn signal lamps, measured at a 45-degree angle where any SAE Standard incorporated by reference required visibility of the lamps at a 45-degree angle. Objections were raised that the proposed values were too high and that there was no safety benefit in requiring them. The NHTSA, on the basis of its analysis of cost benefit factors, has not adopted the proposal.

The amendment does not adopt the proposal that both red and yellow rear turn signal lamps have the same maximum candlepower limitation. The subject of the color of rear turn signal lamps will be addressed in a forthcoming notice, in Docket No. 69-19.

The SAE standard applicable to parking lamps in Table III has been changed to SAE Standard J222, "Parking Lamps (Position Lamps)," December 1970. Paragraph S4.1.1.11, which specifies photometric values for parking lamps, is

deleted as these values are incorporated in the revised SAE standard.

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is revised

Effective date: January 1, 1973. Because the amendment creates no additional burden, it is found for good cause shown that an effective date earlier than one hundred eighty days after issuance is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392 and 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on October 2, 1972.

Douglas W. Toms
Administrator

37 F.R. 21328
October 7, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 72-5; Notice 2)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to specify stop and turn signal lens area requirements that are identical for all motor vehicles less than 80 inches in overall width.

As the NHTSA explained in its proposal published April 8, 1972 (37 F.R. 7107), Standard No. 108 requires (Table III) passenger cars, multipurpose passenger vehicles, trucks, and buses to be equipped with "Class A" turn signal lamps. Class A lamps prior to Standard No. 108 were generally found only on vehicles whose overall width is 80 inches or more. Class A lamps differ from Class B lamps in having a minimum effective projected illuminated area of 12 square inches rather than $3\frac{1}{2}$ square inches. Paragraph S4.1.1.7 of Standard No. 108, however, permits passenger cars to meet Class A photometrics through an effective projected illuminated area not less than that of a Class B lamp ($3\frac{1}{2}$ square inches). The NHTSA, in response to a petition from Jeep Corporation, proposed that this exception be provided for all vehicles less than 80 inches in overall width, instead of being limited to passenger cars, and that stop lamps be included as well.

The comments received supported the proposal. Recommendations were also made as to standardization of lens area and identification of lamps providing Class A photometric values. These will be treated as suggestions for future rulemaking since they were beyond the scope of the proposal.

In consideration of the foregoing, the first sentence of paragraph S4.1.1.7 of 49 CFR 571.108, Standard No. 108, is revised . . .

Effective date: January 1, 1973. Because the amendment relaxes a requirement and creates no additional burden, it is found for good cause shown that an effective date earlier than one hundred eighty days after issuance is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407), and the delegation of authority at 49 CFR 1.51.

Issued on: October 26, 1972.

Charles H. Hartman
Acting Administrator

37 F.R. 23272
November 1, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment****(Docket No. 72-5; Notice 2)**

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to specify stop and turn signal lens area requirements that are identical for all motor vehicles less than 80 inches in overall width.

As the NHTSA explained in its proposal published April 8, 1972 (37 F.R. 7107), Standard No. 108 requires (Table III) passenger cars, multipurpose passenger vehicles, trucks, and buses to be equipped with "Class A" turn signal lamps. Class A lamps prior to Standard No. 108 were generally found only on vehicles whose overall width is 80 inches or more. Class A lamps differ from Class B lamps in having a minimum effective projected illuminated area of 12 square inches rather than $3\frac{1}{2}$ square inches. Paragraph S4.1.1.7 of Standard No. 108, however, permits passenger cars to meet Class A photometrics through an effective projected illuminated area not less than that of a Class B lamp ($3\frac{1}{2}$ square inches). The NHTSA, in response to a petition from Jeep Corporation, proposed that this exception be provided for all vehicles less than 80 inches in overall width, instead of being limited to passenger cars, and that stop lamps be included as well.

The comments received supported the proposal. Recommendations were also made as to standardization of lens area and identification of lamps providing Class A photometric values. These will be treated as suggestions for future rulemaking since they were beyond the scope of the proposal.

In consideration of the foregoing, the first sentence of paragraph S4.1.1.7 of 49 CFR 571.108, Standard No. 108, is revised . . .

Effective date: January 1, 1973. Because the amendment relaxes a requirement and creates no additional burden, it is found for good cause shown that an effective date earlier than one hundred eighty days after issuance is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407), and the delegation of authority at 49 CFR 1.51.

Issued on: October 26, 1972.

Charles H. Hartman
Acting Administrator

37 F.R. 23272
November 1, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 71-21; Notice 4)

This notice amends 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to specify minimum photometric-candlepower requirements for motorcycle turn signal lamps.

Standard No. 108 was amended on October 7, 1972 (37 F.R. 21328), effective January 1, 1973, to specify, in part, that turn signal lamps are not required to meet the minimum photometric values at each test point specified in Table 2 of SAE Standard J575d, "Tests for Motor Vehicle Lighting Devices and Components," if the sum of the candlepower measured at the test points within the groups listed in Figure 1 is not less than the sum of the candlepower values for such test points specified in J575d. Effective January 1, 1973, Class B turn signal lamps are required on motorcycles, and the minimum photometric candlepower values for such lamps are one-half those required for Class A turn signals. The amendment failed to make this distinction, and this notice corrects the omission.

In consideration of the foregoing, paragraph S4.1.1.12 of 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is amended

Effective date: January 1, 1973. Because the amendment creates no additional burden, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on November 21, 1972.

Douglas W. Toms
Administrator

37 F.R. 25235
November 29, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 71-21; Notice 4)

This notice amends 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to specify minimum photometric-candlepower requirements for motorcycle turn signal lamps.

Standard No. 108 was amended on October 7, 1972 (37 F.R. 21328), effective January 1, 1973, to specify, in part, that turn signal lamps are not required to meet the minimum photometric values at each test point specified in Table 2 of SAE Standard J575d, "Tests for Motor Vehicle Lighting Devices and Components," if the sum of the candlepower measured at the test points within the groups listed in Figure 1 is not less than the sum of the candlepower values for such test points specified in J575d. Effective January 1, 1973, Class B turn signal lamps are required on motorcycles, and the minimum photometric candlepower values for such lamps are one-half those required for Class A turn signals. The amendment failed to make this distinction, and this notice corrects the omission.

In consideration of the foregoing, paragraph S4.1.1.12 of 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is amended

Effective date: January 1, 1973. Because the amendment creates no additional burden, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority from the Secretary of Transportation to the National Highway Traffic Safety Administrator, 49 CFR 1.51.

Issued on November 21, 1972.

Douglas W. Toms
Administrator

37 F.R. 25235
November 29, 1972

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices and Associated Equipment

(Docket No. 69-18; Notice 14)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 3, to delete the requirements of the warpage tests for plastic lenses used on lamps.

The NHTSA proposed on July 7, 1972 (37 F.R. 13350), that the lens warpage test be deleted from the motor vehicle lighting standard. The test requirement itself, as contained in an SAE Standard incorporated by reference, lacked objectivity, in that it prohibited warpage that would "affect the proper functioning of the device" without further clarification. The lens warpage test did not appear to add significantly to motor vehicle safety.

Comments to the docket were divided, some confirming the NHTSA position on both issues. Others objected, suggesting that the agency seek to establish objective compliance criteria. On review of all data and arguments, the NHTSA finds that a safety problem that would justify the development of such a requirement has not been demonstrated.

In the future, if serious problems of lens warpage arise, they may be dealt with immediately

as safety-related defects under section 113 of the National Traffic and Motor Vehicle Safety Act, and steps can be taken to develop and promulgate an objective test.

In consideration of the foregoing, 49 CFR § 571.108 is amended

Effective date: Jan. 1, 1973. Because this amendment relieves a restriction and creates no additional burden, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority at 49 CFR 1.51.

Issued on December 29, 1972.

Jack L. Goldberg
Acting Administrator

38 F.R. 743
January 4, 1973



PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices and Associated Equipment

(Docket No. 69-18; Notice 14)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 3, to delete the requirements of the warpage tests for plastic lenses used on lamps.

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Comments to the docket were divided, some confirming the NHTSA position on both issues. Others objected, suggesting that the agency seek to establish objective compliance criteria. On review of all data and arguments, the NHTSA finds that a safety problem that would justify the development of such a requirement has not been demonstrated.

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In consideration of the foregoing, 49 CFR § 571.108 is amended

Effective date: Jan. 1, 1973. Because this amendment relieves a restriction and creates no additional burden, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

This notice is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and the delegation of authority at 49 CFR 1.51.

Issued on December 29, 1972.

Jack L. Goldberg
Acting Administrator

38 F.R. 743
January 4, 1973

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices and Associated Equipment

(Docket No. 71-21; Notice 6)

This notice denies petitions for reconsideration of an amendment to Federal Motor Vehicle Safety Standard No. 108 published on October 7, 1972, that modified the method by which conformity of certain lamps to photometric requirements is determined.

The National Highway Traffic Safety Administration amended 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, on October 7, 1972, (37 F.R. 21328) to allow photometric conformance of parking lamps, taillamps, stop lamps, and turn signal lamps to be based upon the sum of values derived from grouping individual test points rather than upon a requirement of conformance at each test point. Thereafter, pursuant to 49 CFR § 553.35, petitions for reconsideration of the amendment were filed by American Motors Corporation, Ford Motor Company, General Motors Corporation, SWF-Spezial fabrik fur Autozubehor Gustav Rau GmbH, and Volkswagen of America, Inc. Petitions raising the same issues but not timely filed were submitted by Automobiles Peugeot on behalf of the Association Peugeot-Renault and Westfälische Metall Industry KG. Chrysler Corporation submitted a request for an interpretation. The Administration has declined to grant requested relief.

1. *Inclusion of SAE Recommended Practice J256.* All petitioners except General Motors asked for adoption in its entirety of SAE Recommended Practice J256, "Service Performance Requirements for Motor Vehicle Lighting Devices," July 1971. Petitioners complain that the NHTSA adopted the grouping concept and photometric values of Table I and Table 3 of the Practice without including a correction adjustment factor or a tolerance for maximum

photometric values. SAE J256 permits an adjustment in lamp orientation from design position not to exceed 3 degrees in determining compliance with photometric requirements. SAE J256 also permits a tolerance of 10 per cent in determining whether group photometric requirements are met. It further provides that the candlepower of parking lamps, taillamps, stop lamps, and turn lamps shall not exceed 120 per cent of the maximum values specified in appropriate SAE Standards. In support of their request petitioners argue that a readjustment factor is necessitated by the difficulties that test laboratories experience in insuring that lamps of complex and varied shapes are mounted with accuracy in the design position. Tolerances in candlepower output are requested because of variations in test lamp bulbs, and in manufacture and assembly of the lamps themselves.

When Standard No. 108 required compliance at every test point, the SAE Standards incorporated by reference did not permit the tolerances that petitioners request. Compliance by meeting minimum group totals rather than compliance at each test point is intended to insert a factor to compensate for those variations in test methods and manufacture that apparently concern industry. The tolerances in the SAE Recommended Practice represent a further lowering of the quantitative performance requirements. The NHTSA has determined that no sufficient reasons have been given to lower these requirements further, and that it is not in the interest of motor vehicle safety to do so. The petitions are denied.

2. *Excluded lamps.* General Motors requests the inclusion in the group testing concept of clearance lamps, side marker lamps, and identification lamps, as originally proposed by NHTSA.

Effective: February 5, 1973

GM's petition is denied. Under the proposal, photometric requirements for clearance, side marker, and identification lamps would have been increased, and identical to those for parking lamps and taillamps. But the proposed values were not adopted, and these lamps were not included in the group concept. The NHTSA believes that the group concept is inappropriate for lamps of low candlepower, and that requirements should be met at each test point. The photometric requirements for clearance, side marker, and identification lamps, are minimal in nature and identical at all test points.

3. *Interpretations.* Chrysler Corporation has asked whether "the maximum values provided in Figure 1 may be used in place of the maximum photometric values set out in paragraph S5.2," which states in pertinent part that "the maximum photometric candlepower values for one-compartment and two-compartment stop lamps shall be 300 candlepower." The answer is yes, and paragraph S5.2 is being deleted.

Chrysler has also asked whether "subscripts (f) and (g) of Table 2 of . . . SAE Standard J575d applies to the measurement of the maximum values in . . . Figure 1 . . .". There is no footnote (g) in J575d, and footnote (f) does apply.

Clarification has also been requested as to whether the maximum tail lamp values in Figure 1 are intended to apply at test points below the horizontal. The answer is no; the limitation, as was true before the amendment, is restricted to the horizontal and above.

In consideration of the foregoing, section S5 of 49 CFR § 571.108, Motor Vehicle Standard No. 108 is amended by removing the designation "S5.1" and deleting paragraph S5.2.

Effective date: February 5, 1973. Because the amendment clarifies an ambiguity and creates no additional burden, good cause has been shown that an effective date earlier than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on January 30, 1973.

Douglas W. Toms
Administrator

38 F.R. 3331
February 5, 1973

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices and Associated Equipment

(Docket No. 71-21; Notice 6)

This notice denies petitions for reconsideration of an amendment to Federal Motor Vehicle Safety Standard No. 108 published on October 7, 1972, that modified the method by which conformity of certain lamps to photometric requirements is determined.

The National Highway Traffic Safety Administration amended 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, on October 7, 1972, (37 F.R. 21328) to allow photometric conformance of parking lamps, taillamps, stop lamps, and turn signal lamps to be based upon the sum of values derived from grouping individual test points rather than upon a requirement of conformance at each test point. Thereafter, pursuant to 49 CFR § 553.35, petitions for reconsideration of the amendment were filed by American Motors Corporation, Ford Motor Company, General Motors Corporation, SWF-Spezial fabrik fur Autozubehor Gustav Rau GmbH, and Volkswagen of America, Inc. Petitions raising the same issues but not timely filed were submitted by Automobiles Peugeot on behalf of the Association Peugeot-Renault and Westfalische Metall Industry KG. Chrysler Corporation submitted a request for an interpretation. The Administration has declined to grant requested relief.

1. *Inclusion of SAE Recommended Practice J256.* All petitioners except General Motors asked for adoption in its entirety of SAE Recommended Practice J256, "Service Performance Requirements for Motor Vehicle Lighting Devices," July 1971. Petitioners complain that the NHTSA adopted the grouping concept and photometric values of Table I and Table 3 of the Practice without including a correction adjustment factor or a tolerance for maximum

photometric values. SAE J256 permits an adjustment in lamp orientation from design position not to exceed 3 degrees in determining compliance with photometric requirements. SAE J256 also permits a tolerance of 10 per cent in determining whether group photometric requirements are met. It further provides that the candlepower of parking lamps, taillamps, stop lamps, and turn lamps shall not exceed 120 per cent of the maximum values specified in appropriate SAE Standards. In support of their request petitioners argue that a readjustment factor is necessitated by the difficulties that test laboratories experience in insuring that lamps of complex and varied shapes are mounted with accuracy in the design position. Tolerances in candlepower output are requested because of variations in test lamp bulbs, and in manufacture and assembly of the lamps themselves.

When Standard No. 108 required compliance at every test point, the SAE Standards incorporated by reference did not permit the tolerances that petitioners request. Compliance by meeting minimum group totals rather than compliance at each test point is intended to insert a factor to compensate for those variations in test methods and manufacture that apparently concern industry. The tolerances in the SAE Recommended Practice represent a further lowering of the quantitative performance requirements. The NHTSA has determined that no sufficient reasons have been given to lower these requirements further, and that it is not in the interest of motor vehicle safety to do so. The petitions are denied.

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Effective: February 5, 1973

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In consideration of the foregoing, section S5 of 49 CFR § 571.108, Motor Vehicle Standard No. 108 is amended by removing the designation "S5.1" and deleting paragraph S5.2.

Effective date: February 5, 1973. Because the amendment clarifies an ambiguity and creates no additional burden, good cause has been shown that an effective date earlier than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on January 30, 1973.

Douglas W. Toms
Administrator

38 F.R. 3331
February 5, 1973

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices and Associated Equipment

(Docket No. 71-21; Notice 7)

This notice corrects the amendment to 49 CFR § 571.108 published on February 5, 1973 (38 F.R. 3331) that removed the designation "S5.1" and deleted paragraph S5.2 from Motor Vehicle Safety Standard No. 108.

The amendment inadvertently overlooked the fact that a new paragraph S5.3, concerning lens warpage, had been added to Standard No. 108 on January 4, 1973 (38 F.R. 743). The notice published on February 5, 1973 should have retained the designation of S5.1, deleted S5.2 and renumbered S5.3.

In consideration of the foregoing, section S5 of 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, is amended by adding the designation "S5.1" to the first paragraph, and

changing the designation of paragraph S5.3 to read "S5.2".

Effective date: February 28, 1973. Because the amendment corrects an error and creates no additional burden good cause has been shown that an effective date earlier than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51).

Issued on February 21, 1973.

Douglas W. Toms
Administrator

38 F.R. 5338
February 28, 1973

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices and Associated Equipment

(Docket No. 71-21; Notice 7)

This notice corrects the amendment to 49 CFR § 571.108 published on February 5, 1973 (38 F.R. 3331) that removed the designation "S5.1" and deleted paragraph S5.2 from Motor Vehicle Safety Standard No. 108.

The amendment inadvertently overlooked the fact that a new paragraph S5.3, concerning lens warpage, had been added to Standard No. 108 on January 4, 1973 (38 F.R. 743). The notice published on February 5, 1973 should have retained the designation of S5.1, deleted S5.2 and renumbered S5.3.

In consideration of the foregoing, section S5 of 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, is amended by adding the designation "S5.1" to the first paragraph, and

changing the designation of paragraph S5.3 to read "S5.2".

Effective date: February 28, 1973. Because the amendment corrects an error and creates no additional burden good cause has been shown that an effective date earlier than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51).

Issued on February 21, 1973.

Douglas W. Toms
Administrator

38 F.R. 5338
February 28, 1973

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment**

(Docket No. 71-21; Notice 6)

This notice amends the test procedures relating to bulbs in Motor Vehicle Safety Standard No. 108, effective January 1, 1974.

The National Highway Traffic Safety Administration proposed on December 1, 1972 (37 F.R. 25535) to amend two test procedures relating to bulbs. As the NHTSA explained:

"At the present time, test bulbs must be 'operated at their rated mean spherical candlepower unless otherwise specified.' Not all bulbs have been assigned a mean spherical candlepower rating. The proposal specifies that when no rating has been assigned by the bulb manufacturer or the SAE or, if the lamp is sealed and the bulb cannot be replaced, the bulb shall be operated at design voltage. Secondly, instances have arisen where noncompliance of lamps could not be proven in marginal cases because of the tolerances permitted in test bulbs. The notice seeks to render test results more reproducible by proposing that the filaments of test bulbs (other than sealed-in bulbs) be positioned within $\pm .010$ inch of the nominal design position specified in SAE Standard J573d, "Lamp Bulbs and Sealed Units," or by the bulb manufacturer. Other requirements of SAE Standard J575d, incorporated by reference into Standard No. 108, remain applicable."

Comments generally supported the notice, and the standard is being amended as proposed. The chief objection voiced was that it is difficult to obtain test bulbs at the proposed filament location tolerances. The NHTSA finds, however, that these difficulties are outweighed by the need for objective and repeatable tests. Moreover, while the NHTSA intends to use a bulb with the filament positioned within $\pm .010$ inch of the de-

sign position for its compliance tests, a manufacturer is not required to do so. If the manufacturer has test data to show a correlation between a Standard No. 108 test bulb and one used by him outside the $\pm .010$ -inch tolerances, his certification could be based on the test data and the correlation factor, assuming that that factor indicated compliance. Similarly if it can be demonstrated that the lamp complied using test bulbs having filament locations on both the plus and minus sides of the design position, outside the $\pm .010$ tolerance but within the other tolerances of J573, compliance could be certified.

The NHTSA would also like to make clear that only the filament in the test bulb for the function tested need meet the $.010$ -inch tolerance. For example, if a combination tail lamp/stop lamp is being tested for the tail lamp function, the stop lamp filament need not be within the tolerance, and a bulb with a correctly positioned filament may subsequently be substituted for the stop lamp test.

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is revised by adopting new paragraphs S4.1.1.19 and S4.1.1.20. . . .

Effective date: January 1, 1974.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 38 F.R. 12147)

Issued on June 15, 1973.

James E. Wilson
Associate Administrator
Traffic Safety Programs

38 F.R. 16230
June 21, 1973

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment****(Docket No. 71-21; Notice 6)**

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sign position for its compliance tests, a manufacturer is not required to do so. If the manufacturer has test data to show a correlation between a Standard No. 108 test bulb and one used by him outside the $\pm .010$ -inch tolerances, his certification could be based on the test data and the correlation factor, assuming that that factor indicated compliance. Similarly if it can be demonstrated that the lamp complied using test bulbs having filament locations on both the plus and minus sides of the design position, outside the $\pm .010$ tolerance but within the other tolerances of J573, compliance could be certified.

The NHTSA would also like to make clear that only the filament in the test bulb for the function tested need meet the $.010$ -inch tolerance. For example, if a combination tail lamp/stop lamp is being tested for the tail lamp function, the stop lamp filament need not be within the tolerance, and a bulb with a correctly positioned filament may subsequently be substituted for the stop lamp test.

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is revised by adopting new paragraphs S4.1.1.19 and S4.1.1.20. . . .

Effective date: January 1, 1974.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 38 F.R. 12147)

Issued on June 15, 1973.

James E. Wilson
Associate Administrator
Traffic Safety Programs

38 F.R. 16230
June 21, 1973

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment**

(Docket No. 69-19; Notice 6)

This notice amends the requirements of Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices and Associated Equipment* applicable to trailers that are either less than 6 feet in overall length or 30 inches in overall width.

On October 25, 1972 the National Highway Safety Administration proposed (Docket No. 69-19; Notice 3, 37 F.R. 22801) as part of a comprehensive rule making action that small trailers need not be equipped with the complement of lighting devices required of larger trailers. The agency proposed that a trailer less than 30 inches wide may be equipped with only one of each of the following devices located at or near its vertical centerline: tail lamp, stop lamp, and rear reflex reflector. The NHTSA also proposed that a trailer that is less than 6 feet in overall length, including the trailer tongue, need not be equipped with front side marker lamps and front side reflex reflectors. In the opinion of the NHTSA this equipment is sufficient to meet the needs of motor vehicle safety. Commenters generally agreed, and Standard No. 108 is being amended as proposed. Two suggested that two rear reflectors be required. The amendment, which is phrased as an option, does not preclude a two-reflector configuration if the manufacturer wishes. In accordance with several comments, the amendments, which relieve a restriction, are being made effective 30 days after publication of this notice in the *Federal Register*.

Several amendments of Standard 108 are also being made by this notice to reflect the expiration of the stated period for certain compliance options. Paragraphs S4.1.1.13, S4.1.1.14, and S4.1.1.15 of Standard 108 deferred compliance with amended backup lamp and license plate lamp requirements, and with turn signal require-

ments for motorcycles, until January 1, 1973, at the manufacturer's option. Since these options are no longer permissible, the paragraphs are being deleted. Rather than redesignating the succeeding subparagraphs of S4.1.1 as has been the practice in the past, the NHTSA, in order to eliminate confusion, intends to maintain the current order and adopt new numbers in successive order for new requirements. A similar policy has been adopted with respect to footnotes in the Tables. Thus, the trailer lighting amendments adopted by this notice are designated S4.1.1.17 and S4.1.1.18. S4.1.1.16 is amended to delete the expired option allowing use of Class B turn signals on vehicles less than 80 inches wide designed to complete a durability test of 100,000 cycles. Appropriate amendments reflecting these deletions are made to the footnotes and references in Tables I, III, and IV of the standard.

In consideration of the foregoing, 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, is amended. . . .

Effective date: July 23, 1973. Because the amendment in part relieves a restriction and creates no additional burden, and in part is administrative in nature, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Section 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 USC 1392, 1407; delegation of authority at 38 F.R. 12147.)

Issued on June 15, 1973.

James E. Wilson
Associate Administrator
Traffic Safety Programs

38 F.R. 16875
June 27, 1973

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment**

(Docket No. 69-19; Notice 6)

This notice amends the requirements of Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices and Associated Equipment* applicable to trailers that are either less than 6 feet in overall length or 30 inches in overall width.

On October 25, 1972 the National Highway Safety Administration proposed (Docket No. 69-19; Notice 3, 37 F.R. 22801) as part of a comprehensive rule making action that small trailers need not be equipped with the complement of lighting devices required of larger trailers. The agency proposed that a trailer less than 30 inches wide may be equipped with only one of each of the following devices located at or near its vertical centerline: tail lamp, stop lamp, and rear reflex reflector. The NHTSA also proposed that a trailer that is less than 6 feet in overall length, including the trailer tongue, need not be equipped with front side marker lamps and front side reflex reflectors. In the opinion of the NHTSA this equipment is sufficient to meet the needs of motor vehicle safety. Commenters generally agreed, and Standard No. 108 is being amended as proposed. Two suggested that two rear reflectors be required. The amendment, which is phrased as an option, does not preclude a two-reflector configuration if the manufacturer wishes. In accordance with several comments, the amendments, which relieve a restriction, are being made effective 30 days after publication of this notice in the *Federal Register*.

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ments for motorcycles, until January 1, 1973, at the manufacturer's option. Since these options are no longer permissible, the paragraphs are being deleted. Rather than redesignating the succeeding subparagraphs of S4.1.1 as has been the practice in the past, the NHTSA, in order to eliminate confusion, intends to maintain the current order and adopt new numbers in successive order for new requirements. A similar policy has been adopted with respect to footnotes in the Tables. Thus, the trailer lighting amendments adopted by this notice are designated S4.1.1.17 and S4.1.1.18. S4.1.1.16 is amended to delete the expired option allowing use of Class B turn signals on vehicles less than 80 inches wide designed to complete a durability test of 100,000 cycles. Appropriate amendments reflecting these deletions are made to the footnotes and references in Tables I, III, and IV of the standard.

In consideration of the foregoing, 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, is amended. . . .

Effective date: July 23, 1973. Because the amendment in part relieves a restriction and creates no additional burden, and in part is administrative in nature, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Section 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 USC 1392, 1407; delegation of authority at 38 F.R. 12147.)

Issued on June 15, 1973.

James E. Wilson
Associate Administrator
Traffic Safety Programs

38 F.R. 16875
June 27, 1973

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 69-19; Notice 7)

This notice amends 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to specify requirements for rectangular headlamps that may be used as an option in a four-headlamp system until September 1, 1976. The notice also sets forth NHTSA policy concerning rectangular headlamps after such time.

Interested persons have been afforded an opportunity to participate in the making of the amendment by a notice of proposed rulemaking (Docket No. 69-19; Notice 5) published on June 8, 1973 (38 F.R. 15082), and due consideration has been given to all comments received in response to the notice, insofar as they relate to matters within its scope.

The prior notice responded to a petition by General Motors. Under it, a rectangular headlamp approximately 6¾ in. by 4¼ in. would be permissible in five headlamp types (Types 1A through 5A) proposed for the two four-lamp front lighting Systems B and C proposed in Notice 3 to Docket No. 69-19 (37 F.R. 22801). Photometric values based upon Notice 3 were also proposed. As Notice 5 was technically an amendment of Notice 3, other headlighting requirements of the earlier proposal, such as those affecting mounting and aiming, were incorporated by reference.

Based upon comments to the docket and consideration of the issues involved, this amendment allowing an optional rectangular headlamp system differs from the proposal in several respects. The most important of these is its incorporation into Standard No. 108 as it is currently in effect, rather than into the amendment proposed by Notice 3. Thus, only two of the five proposed rectangular headlamp types

have been adopted, and the photometric, mounting, and other requirements are with slight exceptions those that are presently required for a four-headlamp system. Dimensions are slightly different from those proposed, at the request of General Motors which has modified its original experimental design.

The comments received expressed a variety of opinions on the rectangular headlamp proposal. The most common point of agreement was that there is no clear safety benefit or detriment in the use of rectangular headlamps. The NHTSA expressed concern in the notice "that there should not be such a proliferation of headlamp shapes and sizes that the motorist who has an immediate need to replace a headlamp has difficulty in finding one," and this concern was shared by several commenters. The points were also made that rectangular headlamps may be more expensive than conventional ones, and that they cannot be mechanically aimed with equipment currently in use. Finally, the question was raised whether rectangular headlamps might encounter more service performance difficulties than round ones.

Commenters generally supported the relief of a design restriction imposed by Standard No. 108, and this has been a prime determinant in the NHTSA's decision to permit certain rectangular headlamps. The NHTSA has determined that, by reducing the proposed number of types of rectangular headlamps from five to two, there will not be an undue proliferation of headlamps on the replacement market. Since these headlamps are optional and not mandatory, their cost is not a major relevant factor to be considered in determining whether they should be permitted. Rectangular headlamps can be optically

Effective: January 1, 1974

aimed, the method in predominant use in State motor vehicle inspections, and thus the NHTSA did not find the difficulty of mechanical aiming a persuasive argument. In addition, mechanical aimers capable of aiming rectangular headlamps are under development and should shortly be commercially available. The NHTSA is, of course, concerned as to whether the rectangular headlamps will encounter more service difficulties than conventional ones, but does not believe that the issue can be proven until such units are mass-produced and actually in service.

These amendments to Standard No. 108 represent an interim rather than a final decision on the issues of rectangular headlamps and appropriate dimensions. During 1974 and 1975 NHTSA expects the world motor vehicle industry, through international standards organizations and regular trade and professional associations, to arrive, if possible, at a consensus for one set of requirements, including dimensions for rectangular headlamps. Late in 1975, the NHTSA intends to announce its final decision on the matter: whether to remain with the requirements and dimensions adopted in this notice, to propose and adopt others, or to revoke the option. The agency at this point is not committing itself either to adopt any consensus dimensions or to perpetuate the ones desired by General Motors, though the field experience with such lamps over the next two years may be expected to have some influence in the final decision. Adoption of these optional dimensions by

a manufacturer during this interim period is at his own risk, and the cost of changing over from interim to permanent dimensions, if different, in 1977 model year tooling will not be considered a material factor in the decision on permanent dimensions. It is planned that the interim amendment will be in effect through August 31, 1976, and that no petitions will be entertained for variant headlamp dimensions or system configurations before the end of that period, to avoid multiplying stock items and disrupting supply channels.

In consideration of the foregoing, 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, is amended by adding a new paragraph S4.1.1.21. . . .

Effective date: January 1, 1974. Because the amendment creates an optional system without imposing new mandatory requirements on any person it is found for good cause shown that an effective date earlier than 180 days after the issuance of the amendment is in the public interest.

(Secs. 103, 119 Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on November 23, 1973.

James B. Gregory
Administrator

38 F.R. 33084
November 30, 1973

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 69-19; Notice 7)

This notice amends 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to specify requirements for rectangular headlamps that may be used as an option in a four-headlamp system until September 1, 1976. The notice also sets forth NHTSA policy concerning rectangular headlamps after such time.

Interested persons have been afforded an opportunity to participate in the making of the amendment by a notice of proposed rulemaking (Docket No. 69-19; Notice 5) published on June 8, 1973 (38 F.R. 15082), and due consideration has been given to all comments received in response to the notice, insofar as they relate to matters within its scope.

The prior notice responded to a petition by General Motors. Under it, a rectangular headlamp approximately 6¾ in. by 4¼ in. would be permissible in five headlamp types (Types 1A through 5A) proposed for the two four-lamp front lighting Systems B and C proposed in Notice 3 to Docket No. 69-19 (37 F.R. 22801). Photometric values based upon Notice 3 were also proposed. As Notice 5 was technically an amendment of Notice 3, other headlighting requirements of the earlier proposal, such as those affecting mounting and aiming, were incorporated by reference.

Based upon comments to the docket and consideration of the issues involved, this amendment allowing an optional rectangular headlamp system differs from the proposal in several respects. The most important of these is its incorporation into Standard No. 108 as it is currently in effect, rather than into the amendment proposed by Notice 3. Thus, only two of the five proposed rectangular headlamp types

have been adopted, and the photometric, mounting, and other requirements are with slight exceptions those that are presently required for a four-headlamp system. Dimensions are slightly different from those proposed, at the request of General Motors which has modified its original experimental design.

The comments received expressed a variety of opinions on the rectangular headlamp proposal. The most common point of agreement was that there is no clear safety benefit or detriment in the use of rectangular headlamps. The NHTSA expressed concern in the notice "that there should not be such a proliferation of headlamp shapes and sizes that the motorist who has an immediate need to replace a headlamp has difficulty in finding one," and this concern was shared by several commenters. The points were also made that rectangular headlamps may be more expensive than conventional ones, and that they cannot be mechanically aimed with equipment currently in use. Finally, the question was raised whether rectangular headlamps might encounter more service performance difficulties than round ones.

Commenters generally supported the relief of a design restriction imposed by Standard No. 108, and this has been a prime determinant in the NHTSA's decision to permit certain rectangular headlamps. The NHTSA has determined that, by reducing the proposed number of types of rectangular headlamps from five to two, there will not be an undue proliferation of headlamps on the replacement market. Since these headlamps are optional and not mandatory, their cost is not a major relevant factor to be considered in determining whether they should be permitted. Rectangular headlamps can be optically

Effective: January 1, 1974

aimed, the method in predominant use in State motor vehicle inspections, and thus the NHTSA did not find the difficulty of mechanical aiming a persuasive argument. In addition, mechanical aimers capable of aiming rectangular headlamps are under development and should shortly be commercially available. The NHTSA is, of course, concerned as to whether the rectangular headlamps will encounter more service difficulties than conventional ones, but does not believe that the issue can be proven until such units are mass-produced and actually in service.

These amendments to Standard No. 108 represent an interim rather than a final decision on the issues of rectangular headlamps and appropriate dimensions. During 1974 and 1975 NHTSA expects the world motor vehicle industry, through international standards organizations and regular trade and professional associations, to arrive, if possible, at a consensus for one set of requirements, including dimensions for rectangular headlamps. Late in 1975, the NHTSA intends to announce its final decision on the matter: whether to remain with the requirements and dimensions adopted in this notice, to propose and adopt others, or to revoke the option. The agency at this point is not committing itself either to adopt any consensus dimensions or to perpetuate the ones desired by General Motors, though the field experience with such lamps over the next two years may be expected to have some influence in the final decision. Adoption of these optional dimensions by

a manufacturer during this interim period is at his own risk, and the cost of changing over from interim to permanent dimensions, if different, in 1977 model year tooling will not be considered a material factor in the decision on permanent dimensions. It is planned that the interim amendment will be in effect through August 31, 1976, and that no petitions will be entertained for variant headlamp dimensions or system configurations before the end of that period, to avoid multiplying stock items and disrupting supply channels.

In consideration of the foregoing, 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, is amended by adding a new paragraph S4.1.1.21. . . .

Effective date: January 1, 1974. Because the amendment creates an optional system without imposing new mandatory requirements on any person it is found for good cause shown that an effective date earlier than 180 days after the issuance of the amendment is in the public interest.

(Secs. 103, 119 Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on November 23, 1973.

James B. Gregory
Administrator

38 F.R. 33084
November 30, 1973

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 72-22; Notice 2)

This notice amends Federal Motor Vehicle Safety Standard No. 108 to modify requirements for lighting equipment on mobile structure trailers.

The National Highway Traffic Safety Administration proposed on September 30, 1972 (37 F.R. 20573) that mobile structure trailers (commonly known as mobile homes) need be equipped only with tail lamps, stop lamps, and turn signal lamps if the manufacturer so chooses. As the agency observed in support of its proposal:

"Since January 1, 1968, mobile homes towed on their own wheels have been categorized as 'trailers' by the Federal motor vehicle safety standards, and required to conform to applicable Federal motor vehicle lighting specifications. Pursuant thereto, mobile homes in transit have been equipped with the full complement of trailer lighting equipment required by Standard No. 108: Tail lamps, stop lamps, license plate lamps, reflex reflectors, side marker lamps and reflectors, identification lamps, clearance lamps, and turn signal lamps.

"Because of the limited time a mobile home is on the public ways, manufacturers have been advised that compliance may be achieved by use of a lighting harness removable upon completion of transit. The Trailer Coach Association alleges that installation and removal expense of the wiring harness adds needless cost to 'the only low cost housing available to the majority of people today.' It has petitioned for an amendment of the lighting requirements such that reflex reflectors, license plate lamps, identification lamps, clearance lamps, and side marker lamps would not be required on mobile structure trailers 'when moved under the authority of State issued

permits whose regulations specifically prohibit movement during hours of darkness.' . . .

"Available information indicates that a mobile structure trailer, defined in 49 CFR 571.3 as 'a trailer that has a roof and walls, is at least 10 feet wide, and can be used off road for dwelling or commercial purposes,' cannot move over the public roads of any State without a permit containing the condition that the trailer shall not be moved during hours of darkness. In many jurisdictions, movement is also prohibited during inclement weather or under other conditions of reduced visibility. The safety benefit of requiring the full complement of trailer lighting equipment appears negligible under these circumstances, and unnecessary for the safety of the motoring public."

The proposal was supported by numerous mobile home manufacturers and manufacturers associations, and opposed by a number of manufacturers and suppliers of lighting equipment, by a consumer group, one State, and other interested persons. Those who opposed the proposal argued that the presence of large mobile homes on the public highway is a traffic hazard *per se*, and that a full complement of lights should be required regardless of restrictions on movement. Comments were made that the existence of State laws did not necessarily preclude movement of mobile homes either at night or during periods of inclement weather. Most States, however, require special warning to motorists when mobile structure trailers exceeding a specified width and length are being transported. This warning may be in the form of flagmen, escort vehicles, flags on the towing vehicle, and "wide load" signs.

The NHTSA has concluded that motor vehicle safety does not require a full complement of

Effective: May 29, 1974

lighting devices on mobile structure trailers, whose use of the roads, as a class, is infrequent, and confined to daylight hours, when identification lamps, clearance lamps, and side marker lamps are not normally in use. Accordingly, the standard is being amended to specify that the only required lighting equipment for these vehicles is stop lamps, turn signal lamps, tail lamps, and rear reflex reflectors. The NHTSA has decided to include rear reflex reflectors as required equipment to provide some measure of protection when a mobile structure trailer is parked on the road shoulder at night or during periods of reduced visibility. Mobile structure trailers in interstate transit, however, must continue to meet the requirements of the Bureau of Motor Carrier Safety (49 CFR 393.17, 393.25).

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is revised by adding a new section S4.1.1.25. . . .

Effective Date: May 29, 1974. Because the amendment relieves a restriction, and creates no additional burden, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on April 24, 1974.

James B. Gregory
Administrator

39 F.R. 14946
April 29, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 72-22; Notice 2)

This notice amends Federal Motor Vehicle Safety Standard No. 108 to modify requirements for lighting equipment on mobile structure trailers.

The National Highway Traffic Safety Administration proposed on September 30, 1972 (37 F.R. 20573) that mobile structure trailers (commonly known as mobile homes) need be equipped only with tail lamps, stop lamps, and turn signal lamps if the manufacturer so chooses. As the agency observed in support of its proposal:

"Since January 1, 1968, mobile homes towed on their own wheels have been categorized as 'trailers' by the Federal motor vehicle safety standards, and required to conform to applicable Federal motor vehicle lighting specifications. Pursuant thereto, mobile homes in transit have been equipped with the full complement of trailer lighting equipment required by Standard No. 108: Tail lamps, stop lamps, license plate lamps, reflex reflectors, side marker lamps and reflectors, identification lamps, clearance lamps, and turn signal lamps.

"Because of the limited time a mobile home is on the public ways, manufacturers have been advised that compliance may be achieved by use of a lighting harness removable upon completion of transit. The Trailer Coach Association alleges that installation and removal expense of the wiring harness adds needless cost to 'the only low cost housing available to the majority of people today.' It has petitioned for an amendment of the lighting requirements such that reflex reflectors, license plate lamps, identification lamps, clearance lamps, and side marker lamps would not be required on mobile structure trailers 'when moved under the authority of State issued

permits whose regulations specifically prohibit movement during hours of darkness.' . . .

"Available information indicates that a mobile structure trailer, defined in 49 CFR 571.3 as 'a trailer that has a roof and walls, is at least 10 feet wide, and can be used off road for dwelling or commercial purposes,' cannot move over the public roads of any State without a permit containing the condition that the trailer shall not be moved during hours of darkness. In many jurisdictions, movement is also prohibited during inclement weather or under other conditions of reduced visibility. The safety benefit of requiring the full complement of trailer lighting equipment appears negligible under these circumstances, and unnecessary for the safety of the motoring public."

The proposal was supported by numerous mobile home manufacturers and manufacturers associations, and opposed by a number of manufacturers and suppliers of lighting equipment, by a consumer group, one State, and other interested persons. Those who opposed the proposal argued that the presence of large mobile homes on the public highway is a traffic hazard *per se*, and that a full complement of lights should be required regardless of restrictions on movement. Comments were made that the existence of State laws did not necessarily preclude movement of mobile homes either at night or during periods of inclement weather. Most States, however, require special warning to motorists when mobile structure trailers exceeding a specified width and length are being transported. This warning may be in the form of flagmen, escort vehicles, flags on the towing vehicle, and "wide load" signs.

The NHTSA has concluded that motor vehicle safety does not require a full complement of

Effective: May 29, 1974

lighting devices on mobile structure trailers, whose use of the roads, as a class, is infrequent, and confined to daylight hours, when identification lamps, clearance lamps, and side marker lamps are not normally in use. Accordingly, the standard is being amended to specify that the only required lighting equipment for these vehicles is stop lamps, turn signal lamps, tail lamps, and rear reflex reflectors. The NHTSA has decided to include rear reflex reflectors as required equipment to provide some measure of protection when a mobile structure trailer is parked on the road shoulder at night or during periods of reduced visibility. Mobile structure trailers in interstate transit, however, must continue to meet the requirements of the Bureau of Motor Carrier Safety (49 CFR 393.17, 393.25).

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is revised by adding a new section S4.1.1.25. . . .

Effective Date: May 29, 1974. Because the amendment relieves a restriction, and creates no additional burden, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on April 24, 1974.

James B. Gregory
Administrator

39 F.R. 14946
April 29, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment****(Docket No. 73-25; Notice 2)**

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, to: (1) update the incorporated SAE standard on clearance lamps, (2) group test points for determining photometric conformance of backup lamps, (3) identify load requirements for testing variable load turn signal flashers, and (4) increase the allowable voltage drop in testing turn signal and hazard warning signal flashers.

These amendments are responsive to petitions by Truck Safety Equipment Institute, Signal Stat Corporation, Sylvania GTE and Hope-Tronics, Ltd., as discussed in the notice proposing the amendments, published on November 2, 1973 (38 F.R. 30280). The comments received in response to the notice were unanimous in supporting the change from SAE J592c to J592e as the referenced standard for clearance lamps, and in adopting the grouping of test points to determine compliance of backup lamps with photometric requirements. Comments also unanimously supported the identification of load requirements for testing variable load turn signal flashers, with one commenter suggesting that this might better be accomplished by referencing SAE J590e. The suggestion was not adopted, as J590e incorporates matter not proposed in Notice 1. The proposal that the maximum voltage drop across flashers be increased from 0.45 volt to 0.8 volt was supported by four vehicle

manufacturers with a fifth suggesting an increase to 0.6 volt. It was objected to by six commenters, all of them flasher manufacturers, on the grounds that it would result in a lessening of light output. The NHTSA recognized this possibility in Notice 1, but noted that the diminution would be so slight as to be undetectable by the human eye, while the public would be afforded the choice of a flasher with greater life expectancy. The amendment increasing the minimum voltage drop is adopted as proposed.

In consideration of the foregoing, 49 CFR 571.108 Motor Vehicle Safety Standard No. 108 is amended. . . .

Effective date: May 29, 1974. Because these amendments either relax a requirement or reflect existing widespread industry practice, and create no additional burden, it is found for good cause shown that an effective date earlier than one hundred eighty days after issuance is in the public interest.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51.)

Issued on April 24, 1974.

James B. Gregory
Administrator

39 F.R. 15130
May 1, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment**

(Docket No. 73-25; Notice 2)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, to: (1) update the incorporated SAE standard on clearance lamps, (2) group test points for determining photometric conformance of backup lamps, (3) identify load requirements for testing variable load turn signal flashers, and (4) increase the allowable voltage drop in testing turn signal and hazard warning signal flashers.

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manufacturers with a fifth suggesting an increase to 0.6 volt. It was objected to by six commenters, all of them flasher manufacturers, on the grounds that it would result in a lessening of light output. The NHTSA recognized this possibility in Notice 1, but noted that the diminution would be so slight as to be undetectable by the human eye, while the public would be afforded the choice of a flasher with greater life expectancy. The amendment increasing the minimum voltage drop is adopted as proposed.

In consideration of the foregoing, 49 CFR 571.108 Motor Vehicle Safety Standard No. 108 is amended. . . .

Effective date: May 29, 1974. Because these amendments either relax a requirement or reflect existing widespread industry practice, and create no additional burden, it is found for good cause shown that an effective date earlier than one hundred eighty days after issuance is in the public interest.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51.)

Issued on April 24, 1974.

James B. Gregory
Administrator

39 F.R. 15130
May 1, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment**

(Docket No. 73-33; Notice 2)

This notice amends 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to allow variable-load turn signal flashers on trucks that are capable of accommodating slide-in campers.

The proposal on which the amendment is based was published on January 3, 1974 (39 F.R. 822), pursuant to a petition by Ford Motor Company. Standard No. 108 presently requires turn signal failure indication in accordance with SAE Standard J588d, except on vehicles whose overall width is 80 inches or more, and on vehicles equipped to tow trailers. This has the effect of mandating use of fixed-load flashers, since special circuitry would be necessary to sense and indicate a failure in a variable-load system.

The NHTSA proposed to include trucks capable of accommodating slide-in campers in the group of vehicles not required to have a failure indicator (and hence allowed to have variable-load flashers). The problem presented by Ford may be summarized as follows: when camper turn signal lamps are added to the turn signal circuit of the vehicle carrying the camper, the flash rate will increase, to a level generally exceeding the maximum specified by Standard No. 108. Allowing a variable-load flasher will insure a uniform flash rate when the camper is installed.

In response to the opportunity afforded for comments, seven submittals were received. Six supported the proposal. The seventh commenter,

a foreign equipment manufacturer, opposed the proposal on the grounds that suitable flashers for similar applications are available in Europe.

The NHTSA has determined that the availability of variable-load flashers ensuring flash rate control within the limits of the standard is desirable, and should be permitted on trucks capable of accommodating slide-in campers, despite the lack of lamp failure indication. In order to make clear the intent of the regulation, language is being added to specify that the exception applies only to vehicles with variable-load flashers.

In consideration of the foregoing, paragraph S4.5.6 of 49 CFR 571. 108, Motor Vehicle Safety Standard No. 108 is revised. . . .

Effective date: June 6, 1974. Because the amendment allows an additional option and creates no additional burden, it is found for good cause shown that an immediate effective date is in the public interest.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on May 31, 1974.

James B. Gregory
Administrator

39 F.R. 20063
June 6, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment****(Docket No. 73-33; Notice 2)**

This notice amends 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to allow variable-load turn signal flashers on trucks that are capable of accommodating slide-in campers.

The proposal on which the amendment is based was published on January 3, 1974 (39 F.R. 822), pursuant to a petition by Ford Motor Company. Standard No. 108 presently requires turn signal failure indication in accordance with SAE Standard J588d, except on vehicles whose overall width is 80 inches or more, and on vehicles equipped to tow trailers. This has the effect of mandating use of fixed-load flashers, since special circuitry would be necessary to sense and indicate a failure in a variable-load system.

The NHTSA proposed to include trucks capable of accommodating slide-in campers in the group of vehicles not required to have a failure indicator (and hence allowed to have variable-load flashers). The problem presented by Ford may be summarized as follows: when camper turn signal lamps are added to the turn signal circuit of the vehicle carrying the camper, the flash rate will increase, to a level generally exceeding the maximum specified by Standard No. 108. Allowing a variable-load flasher will insure a uniform flash rate when the camper is installed.

In response to the opportunity afforded for comments, seven submittals were received. Six supported the proposal. The seventh commenter,

a foreign equipment manufacturer, opposed the proposal on the grounds that suitable flashers for similar applications are available in Europe.

The NHTSA has determined that the availability of variable-load flashers ensuring flash rate control within the limits of the standard is desirable, and should be permitted on trucks capable of accommodating slide-in campers, despite the lack of lamp failure indication. In order to make clear the intent of the regulation, language is being added to specify that the exception applies only to vehicles with variable-load flashers.

In consideration of the foregoing, paragraph S4.5.6 of 49 CFR 571.108, Motor Vehicle Safety Standard No. 108 is revised. . . .

Effective date: June 6, 1974. Because the amendment allows an additional option and creates no additional burden, it is found for good cause shown that an immediate effective date is in the public interest.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on May 31, 1974.

James B. Gregory
Administrator

39 F.R. 20063
June 6, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**(Docket No. 74-16; Notice 2)**

This notice amends 49 CFR 571.108, 571.122, and 571.123, Motor Vehicle Safety Standards Nos. 108, 122, and 123, to modify current requirements that apply to motor-driven cycles.

Interested persons have been afforded an opportunity to participate in the making of the amendment by a notice of proposed rulemaking published on April 12, 1974 (39 F.R. 13287) and due consideration has been given to all comments received in response to the notice, insofar as they relate to matters within its scope.

The prior notice responded to petitions by Cycles Peugeot, Ateliers de la Motobecane, and S.I.N.F.A.C., manufacturers, and Bermuda Bikes, Inc., and Robert F. Smith, retail dealers. The notice proposed that a motor-driven cycle whose speed attainable in 1 mile is 30 mph or less need not be equipped with turn signal lamps, and may be equipped with a stop lamp with one-half the photometric output otherwise required. Braking fade and recovery requirements also would not apply to these low-speed vehicles. Maximum stopping distance values for the various tests would be added for test speeds of 25, 20, and 15 mph. Finally, a braking control on the left handlebar would be a permissible alternative to the required right foot braking control.

The comments received addressed both areas of performance covered in the proposal, and areas where no standards currently exist, such as motors, transmissions, pedals, and a request for exemption from Standard No. 119, *Tires for Vehicles Other Than Passenger Cars*. As these latter comments cover matters beyond the scope of the proposal, this notice does not discuss them. The agency, however, has been formally petitioned for rulemaking covering transmissions and Standard No. 119, and will respond to the petitioners in the near future.

The decision by NHTSA not to establish a separate category of vehicle was objected to by

some commenters. In support of their request, they argued that the majority of motor-driven cycles have engines producing only 1.5 to 2 horsepower, and consequent low maximum speeds, reducing the need for forward lighting that is currently required of these vehicles. Petitioners submitted no data justifying their request. The NHTSA, however, intends to study the matter of forward lighting for low-powered two-wheeled vehicles through a research contract with the University of Michigan. When the contract is completed the agency will then decide whether further rulemaking is warranted.

The proposal distinguished motor-driven cycles on the basis of maximum speed attainable in 1 mile, rather than on horsepower, and the value selected, 30 mph, fell within the maximum (40 mph) and minimum (20 mph) suggested by commenters. The NHTSA has concluded therefore that the distinction should be adopted as proposed.

Some manufacturers requested restrictive controls on power plant output, apparently in fear that the engine of a vehicle with a top speed of 30 mph or less could be modified to exceed that speed, and therefore cause the vehicle to no longer comply with the Federal standards. This agency has not found that course of action to be practicable. The various ways to modify a vehicle after purchase cannot be anticipated or prevented at the manufacturer level. On the other hand, the great majority of consumers use their vehicles in the form in which they were purchased. The motor-driven cycle category itself contains a limitation of 5 horsepower, which will be applicable to the special lighting modifications. In the NHTSA's judgment, modifications by consumers and the consequent equipment requirements should continue to be regulated at the State level.

Effective: October 14, 1974

The fact that the agency took no action to propose a reduction in existing headlamp requirements for motor-driven cycles was criticized by several manufacturers as unduly restrictive because of the low speed and power output of their vehicles. No justification has been shown for such a change. Motor driven cycles therefore must have sufficient generating and/or battery capacity to meet the headlamp requirements.

There was no substantive objection to the actual proposals for omission of turn signals, reduced stop lamp photometrics, relief from brake fade requirements, inclusion of maximum allowable stopping distances for low speeds, and rear brake control placement. Accordingly, the standards are being amended in the manner proposed.

Standard No. 122 is also being amended to delete the final effectiveness test (S5.5) for those motor-driven cycles excused from the fade and recovery requirements. The purpose of the final effectiveness test is to check the stopping ability of the vehicle after the fade and recovery tests. Since this requirement has been eliminated for motor-driven cycles of low top-speed, the final effectiveness test is redundant, and an unneces-

sary duplication of the second effectiveness test. No safety purpose is served by its retention. Language is also added to the fade and recovery and final effectiveness test procedures (S7.6, S7.7, and S7.8), making it clear that they do not apply to motor-driven cycles whose speed attainable in 1 mile is 30 mph or less.

In consideration of the foregoing, 49 CFR Part 571 is amended

Effective date: October 14, 1974. As the amendments allow new options for compliance, relieve restrictions, and impose no additional burdens on regulated persons, it is found for good cause shown that an effective date earlier than 180 days after issuance of the amendments is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on September 6, 1974.

James B. Gregory
Administrator

39 F.R. 32914
September 12, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

(Docket No. 74-16; Notice 2)

This notice amends 49 CFR 571.108, 571.122, and 571.123, Motor Vehicle Safety Standards Nos. 108, 122, and 123, to modify current requirements that apply to motor-driven cycles.

Interested persons have been afforded an opportunity to participate in the making of the amendment by a notice of proposed rulemaking published on April 12, 1974 (39 F.R. 13287) and due consideration has been given to all comments received in response to the notice, insofar as they relate to matters within its scope.

The prior notice responded to petitions by Cycles Peugeot, Ateliers de la Motobecane, and S.I.N.F.A.C., manufacturers, and Bermuda Bikes, Inc., and Robert F. Smith, retail dealers. The notice proposed that a motor-driven cycle whose speed attainable in 1 mile is 30 mph or less need not be equipped with turn signal lamps, and may be equipped with a stop lamp with one-half the photometric output otherwise required. Braking fade and recovery requirements also would not apply to these low-speed vehicles. Maximum stopping distance values for the various tests would be added for test speeds of 25, 20, and 15 mph. Finally, a braking control on the left handlebar would be a permissible alternative to the required right foot braking control.

The comments received addressed both areas of performance covered in the proposal, and areas where no standards currently exist, such as motors, transmissions, pedals, and a request for exemption from Standard No. 119, *Tires for Vehicles Other Than Passenger Cars*. As these latter comments cover matters beyond the scope of the proposal, this notice does not discuss them. The agency, however, has been formally petitioned for rulemaking covering transmissions and Standard No. 119, and will respond to the petitioners in the near future.

The decision by NHTSA not to establish a separate category of vehicle was objected to by

some commenters. In support of their request, they argued that the majority of motor-driven cycles have engines producing only 1.5 to 2 horsepower, and consequent low maximum speeds, reducing the need for forward lighting that is currently required of these vehicles. Petitioners submitted no data justifying their request. The NHTSA, however, intends to study the matter of forward lighting for low-powered two-wheeled vehicles through a research contract with the University of Michigan. When the contract is completed the agency will then decide whether further rulemaking is warranted.

The proposal distinguished motor-driven cycles on the basis of maximum speed attainable in 1 mile, rather than on horsepower, and the value selected, 30 mph, fell within the maximum (40 mph) and minimum (20 mph) suggested by commenters. The NHTSA has concluded therefore that the distinction should be adopted as proposed.

Some manufacturers requested restrictive controls on power plant output, apparently in fear that the engine of a vehicle with a top speed of 30 mph or less could be modified to exceed that speed, and therefore cause the vehicle to no longer comply with the Federal standards. This agency has not found that course of action to be practicable. The various ways to modify a vehicle after purchase cannot be anticipated or prevented at the manufacturer level. On the other hand, the great majority of consumers use their vehicles in the form in which they were purchased. The motor-driven cycle category itself contains a limitation of 5 horsepower, which will be applicable to the special lighting modifications. In the NHTSA's judgment, modifications by consumers and the consequent equipment requirements should continue to be regulated at the State level.

Effective: October 14, 1974

The fact that the agency took no action to propose a reduction in existing headlamp requirements for motor-driven cycles was criticized by several manufacturers as unduly restrictive because of the low speed and power output of their vehicles. No justification has been shown for such a change. Motor driven cycles therefore must have sufficient generating and/or battery capacity to meet the headlamp requirements.

There was no substantive objection to the actual proposals for omission of turn signals, reduced stop lamp photometrics, relief from brake fade requirements, inclusion of maximum allowable stopping distances for low speeds, and rear brake control placement. Accordingly, the standards are being amended in the manner proposed.

Standard No. 122 is also being amended to delete the final effectiveness test (S5.5) for those motor-driven cycles excused from the fade and recovery requirements. The purpose of the final effectiveness test is to check the stopping ability of the vehicle after the fade and recovery tests. Since this requirement has been eliminated for motor-driven cycles of low top-speed, the final effectiveness test is redundant, and an unneces-

sary duplication of the second effectiveness test. No safety purpose is served by its retention. Language is also added to the fade and recovery and final effectiveness test procedures (S7.6, S7.7, and S7.8), making it clear that they do not apply to motor-driven cycles whose speed attainable in 1 mile is 30 mph or less.

In consideration of the foregoing, 49 CFR Part 571 is amended

Effective date: October 14, 1974. As the amendments allow new options for compliance, relieve restrictions, and impose no additional burdens on regulated persons, it is found for good cause shown that an effective date earlier than 180 days after issuance of the amendments is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51.)

Issued on September 6, 1974.

James B. Gregory
Administrator

39 F.R. 32914
September 12, 1974

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

(Docket No. 69-19; Notice 9)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to waive the requirement that there be a 4-inch minimum spacing between a front turn signal and a low-beam headlamp whenever the turn signal lamp's photometric output is at least two and one-half times the minimum required. The amendment is effective October 17, 1974.

Interested persons have been afforded an opportunity to participate in the making of the amendment by a notice of proposed rulemaking (Docket No. 69-19, Notice 3) published on October 25, 1972 (37 F.R. 22801), and due consideration has been given to the comments received in response to the notice.

In order to enhance detectability of front lamp function by oncoming drivers at a distance, Standard No. 108 through its incorporation of SAE Standard J588d, "Turn Signal Lamps," requires at least 4 inches of spacing between a front turn signal lamp and a low beam headlamp. However, as part of Notice 3, the NHTSA proposed in paragraph S8.12 that turn signal lamps and low beam headlamps could be closer if the candlepower output of the turn signal lamp is at least two and one-half times that specified for yellow turn signal lamps in the SAE standard. Mercedes-Benz of North Amer-

ica has asked the NHTSA to make an early decision on the proposal to facilitate its product development plans.

Comments in general supported the proposal. Some requested removal of the 4-inch limitation regardless of turn signal photometric output. Others felt that the photometric values of all front turn signal lamps should be two and one-half times the present minimum. The NHTSA has decided to amend the standard primarily as proposed, but with reference to the grouped test points of Figure 1 of the standard rather than to the individual test points of J588.

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is amended by adding new paragraph S4.3.1.7

Effective date: October 17, 1974. Because the amendment relieves a restriction without imposing new requirements on any person, it is found for good cause shown that an effective date earlier than 180 days after the issuance of the amendment is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51.)

Issued on September 12, 1974.

James B. Gregory
Administrator

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

(Docket No. 69-19; Notice 9)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to waive the requirement that there be a 4-inch minimum spacing between a front turn signal and a low-beam headlamp whenever the turn signal lamp's photometric output is at least two and one-half times the minimum required. The amendment is effective October 17, 1974.

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Effective date: October 17, 1974. Because the amendment relieves a restriction without imposing new requirements on any person, it is found for good cause shown that an effective date earlier than 180 days after the issuance of the amendment is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51.)

Issued on September 12, 1974.

James B. Gregory
Administrator

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108
Lamps, Reflective Devices and Associated Equipment

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, to resolve an unintended ambiguity between paragraphs S4.1.1.11 and S4.1.1.12, and paragraph S4.3.1.1.

Paragraphs S4.1.1.11, S4.1.1.12 and S4.1.1.22 allow photometric conformance of parking lamps, stop lamps, taillamps, turn signal lamps, and backup lamps to be determined by measurement of sums of values within specified groups of test points. Paragraph S4.3.1.1 prohibits vehicle equipment obscuring the photometric output "at any test point" specified in SAE materials unless auxiliary lighting equipment is provided that meets all photometric requirements. Standard No. 108 can thus be interpreted as requiring the addition of auxiliary lighting equipment if, for example, a single test point of a taillamp is obscured by part of the vehicle, even though the taillamp might meet the group requirements of Figure 1. NHTSA is therefore amending paragraph S4.3.1.1 to remove the ambiguity.

In consideration of the foregoing the second sentence of paragraph S4.3.1.1 of 49 CFR 571.108 Motor Vehicle Safety Standard No. 108 is revised.

Effective date: April 21, 1975. Because the amendment clarifies an ambiguity and creates no additional burden on any person, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51.)

Issued, on April 15, 1975.

James B. Gregory
Administrator

40 F.R. 17574
April 21, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108
Lamps, Reflective Devices and Associated Equipment

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, to resolve an unintended ambiguity between paragraphs S4.1.1.11 and S4.1.1.12, and paragraph S4.3.1.1.

Paragraphs S4.1.1.11, S4.1.1.12 and S4.1.1.22 allow photometric conformance of parking lamps, stop lamps, taillamps, turn signal lamps, and backup lamps to be determined by measurement of sums of values within specified groups of test points. Paragraph S4.3.1.1 prohibits vehicle equipment obscuring the photometric output "at any test point" specified in SAE materials unless auxiliary lighting equipment is provided that meets all photometric requirements. Standard No. 108 can thus be interpreted as requiring the addition of auxiliary lighting equipment if, for example, a single test point of a taillamp is obscured by part of the vehicle, even though the taillamp might meet the group requirements of Figure 1. NHTSA is therefore amending paragraph S4.3.1.1 to remove the ambiguity.

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Effective date: April 21, 1975. Because the amendment clarifies an ambiguity and creates no additional burden on any person, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

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Issued on April 15, 1975.

James B. Gregory
Administrator

40 F.R. 17574

April 21, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 74-34; Notice 2)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to define in objective terms an acceptable level of surface gloss and/or haze for plastic materials used for lamp lenses following an outdoor exposure test. The amendment is effective upon publication in the *Federal Register*. It is based upon a notice of proposed rulemaking published on September 30, 1974 (39 F.R. 35179).

Paragraph S4.1.2 of Standard No. 108 incorporates by reference SAE Recommended Practice J576b, *Plastic materials for use in optical parts, such as lenses and reflectors, of motor vehicle lighting devices*. This practice requires in pertinent part (Paragraph 4.2.2) that, following an outdoor exposure test of 2 years' duration, exposed samples, when compared with unexposed control samples, shall not show haze or loss of surface luster. This requirement has been interpreted as forbidding any haze or loss of surface luster, and has prohibited the use of plastics of uncoated polycarbonate resin, as these plastics show a surface change after outdoor weathering. General Electric Company petitioned for rulemaking to amend Standard No. 108 to define in objective terms an acceptable level of surface gloss, so that uncoated polycarbonate plastic may be used for exterior automotive applications. Although a protective coating is available for the plastic, GE stated that vehicle manufacturers are reluctant to use it because of the cost involved, "from 3-40 cents per lens depending upon the size."

In support of its petition GE submitted a large body of technical information showing the effect of surface gloss reduction on the photometric performance and signaling effectiveness of various types of lighting devices used on

motor vehicles. These tests showed that at the end of a 3-year period the photometric output through uncoated polycarbonate lenses decreases, on the average, less than 10 percent. In GE's view, deglossing to haze levels of 50 percent does not appear significantly to affect the overall photometric performance and signaling effectiveness of a lamp. The effect of haze is to scatter light from the point of maximum intensity to the wider angle test points, resulting in a diminution of light output at the former, and an increase at the latter. In accordance with GE's test data and suggestion, however, the National Highway Traffic Safety Administration (NHTSA) proposed that haze level should not exceed 30 percent. NHTSA tentatively found that the proposed amendments would enhance traffic safety. Polycarbonate lenses appear to offer some benefits lacking in conventional plastics in terms of heat resistance and higher impact strength.

It was also proposed to update the referenced SAE Recommended Practice J576b, to J576c, effective January 1, 1976. This substitution had been previously proposed (Docket No. 69-19; Notice 3, 37 F.R. 22806) and favorably commented upon. The only difference is that J576c requires a 3-year exposure test while J576b requires only a 2-year one.

Comments submitted in response to the notice generally indicated support by vehicle manufacturers, and opposition by manufacturers of lamps and plastic materials. It was argued that the data in the petition did not support a relaxation, and that further data and study were necessary before a decision could be made. These arguments do not appear to have merit. On the basis of the comments, however, the amendment excludes reflex reflectors. The current higher

performance level is justified for reflector materials, which do not have a light source shining through them. In addition, the amendment specifies that the tests are performed on lens materials rather than finished lenses.

The economic effect of the amendment is that by allowing use of uncoated polycarbonate materials, a lens possessing superior heat resistance and impact durability will be made available at a lesser cost.

In consideration of the foregoing, 49 CFR 571.108 is amended. . . .

Effective date: June 18, 1975. Since the amendment does not require compliance before

January 1, 1976 and allows optional compliance until then, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51.)

Issued on June 12, 1975.

James B. Gregory
Administrator

40 F.R. 25677
June 18, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 74-34; Notice 2)

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(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51.)

Issued on June 12, 1975.

James B. Gregory
Administrator

40 F.R. 25677
June 18, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 75-8; Notice 2)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to remove the restriction that would disallow manufacture of vehicles with four-lamp rectangular headlamp systems on and after September 1, 1976.

The NHTSA proposed on April 30, 1975 (40 FR 18795) the termination of the amendment to Standard No. 108 adopted November 30, 1973 (38 FR 33084), that disallowed use of rectangular headlamp systems on motor vehicles manufactured on or after September 1, 1976. In allowing probationary use of the new headlamp system, this agency had concluded that the interests of safety required a period in which the systems could be evaluated as to on-road performance and availability of replacements. A final decision was scheduled for late in 1975 on whether to allow continued use of such systems, and if so, whether to retain the current dimensions or to propose modifications.

The NHTSA has decided to remove the termination date of September 1, 1976, thus allowing indefinite use of four-lamp rectangular headlamp systems, and to retain the current dimensions. In the period that rectangular systems have been in use no service or supply problems have come to this agency's attention. The lamps have been tested and approved by the American Association of Motor Vehicle Administrators. No comments to the notice of April 30, 1975, objected to the removal of the termination date, and all those who commented on the

issue supported it. The dimensions specified in Standard No. 108 have been adopted by the Society of Automotive Engineers in SAE Standard J579c, "Sealed Beam Headlamp Units for Motor Vehicles," December 1975, and are now accepted by the motor vehicle and lighting industries. There has been occasional criticism that these systems increase vehicle weight and cost without a corresponding benefit in safety. Any weight increases are very minor, however. The purpose of the amendment was to remove a design restriction and to allow manufacturers and consumers the freedom to choose an alternative but equivalent headlighting system. The cost increase is not, therefore, mandated by the standard.

The Administrator also requested comments in the April 30, 1975, notice as to the advisability of proposing an amendment to Standard No. 108 that would allow a single two-lamp rectangular system. Commenters generally supported the concept of a two-lamp system, advising dimensions based upon SAE recommendations. The subject is now under consideration by the agency.

In consideration of the foregoing, paragraph S4.1.1.21 of 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is amended by deleting the phrase "manufactured between January 1, 1974 and September 1, 1976" and substituting the phrase "manufactured on or after January 1, 1974".

Effective date: November 24, 1975. Because the amendment relieves a restriction and creates no additional burden on any person it is found

Effective: November 24, 1975

for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51)

Issued on November 17, 1975.

James B. Greory
Administrator

40 F.R. 54426
November 24, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 75-8; Notice 2)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to remove the restriction that would disallow manufacture of vehicles with four-lamp rectangular headlamp systems on and after September 1, 1976.

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Effective date: November 24, 1975. Because the amendment relieves a restriction and creates no additional burden on any person it is found

Effective: November 24, 1975

for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51)

Issued on November 17, 1975.

James B. Greory
Administrator

40 F.R. 54426
November 24, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 75-15; Notice 2)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices and Associated Equipment*, to modify requirements for clearance lamps on vehicles of special configuration.

Notice of the amendment was published on June 5, 1975 (40 FR 24204), and an opportunity afforded for comment. The NHTSA proposed that the inboard visibility angle of 45 degrees for clearance lamps need not be met on a vehicle where it is necessary to mount the lamps on surfaces other than the extreme front or rear to indicate the overall width or for protection from damage during normal operation of the vehicle. Restricted inboard visibility angles of clearance lamps are encountered on many types of vehicles other than boat trailers and horse trailers. Examples are (1) front clearance lamps that are mounted on a truck body behind the cab and below the top of the cab, and (2) front and rear clearance lamps mounted on the fenders of trucks and trailers such as liquid and bulk commodity vehicles and cement mixer carriers.

Eleven comments were submitted by manufacturers, trade associations, and the California Highway Patrol. Ten of these supported the

amendment. The sole dissenter felt that there might be traffic situations where visibility at some inboard positions would be important. Trailmobile and Recreational Vehicle Industry Association requested modifications to Standard No. 108 that were beyond the scope of the proposal and thus were not considered.

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is amended. . . .

Effective date: November 24, 1975. Because the amendment relieves a restriction and creates no additional burden upon any person, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.51)

Issued on November 17, 1975.

James B. Gregory
Administrator

40 F.R. 54427
November 24, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 75-15; Notice 2)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices and Associated Equipment*, to modify requirements for clearance lamps on vehicles of special configuration.

Notice of the amendment was published on June 5, 1975 (40 FR 24204), and an opportunity afforded for comment. The NHTSA proposed that the inboard visibility angle of 45 degrees for clearance lamps need not be met on a vehicle where it is necessary to mount the lamps on surfaces other than the extreme front or rear to indicate the overall width or for protection from damage during normal operation of the vehicle. Restricted inboard visibility angles of clearance lamps are encountered on many types of vehicles other than boat trailers and horse trailers. Examples are (1) front clearance lamps that are mounted on a truck body behind the cab and below the top of the cab, and (2) front and rear clearance lamps mounted on the fenders of trucks and trailers such as liquid and bulk commodity vehicles and cement mixer carriers.

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In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is amended. . . .

Effective date: November 24, 1975. Because the amendment relieves a restriction and creates no additional burden upon any person, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

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Issued on November 17, 1975.

James B. Gregory
Administrator

40 F.R. 54427
November 24, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 69-19; Notice 10)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to clarify the electrical terminal specifications for Type 1A rectangular headlamps.

Standard No. 108 was amended on November 30, 1973, (38 FR 33084) to specify requirements for rectangular headlamps that may be used as an option in a four-headlamp system. Figure 2 of the amended standard specifies certain interchangeability features of Type 1A and 2A rectangular headlamps, including location and arrangement of the electrical terminals. The three terminals shown in Figure 2 are designed as "ground," "lower beam," and "Type 2A upper beam." The terminal designated as "lower beam" is used as the terminal for the upper beam on Type 1A headlamps. This is implied by the notation, "no connection or terminal for Type 1A headlamp," under the phrase "Type 2A upper beam," since the ground is not a connection, but the figure may not be sufficiently clear on that point. In order to make it clear, this notice amends Figure 2 so that the "lower beam" terminal is redesignated as the "Type 2A lower beam or Type 1A upper beam" terminal.

It has also come to the attention of this agency that certain dimensional tolerances of Figure 2 are unnecessarily restrictive and that other methods of dimensioning are more applicable in certain cases. In addition, an optional terminal

configuration permitted for other headlamps is not currently included for the Type 1A and 2A headlamps.

Accordingly, Figure 2 is being revised to provide a tolerance change to the overall lamp width (6.58 inches) and height (4.20 inches). The lamp corner radius of 0.56 inch is changed to 0.54 inch, a terminal spacing of 0.333 inch is changed to 0.335 inch, and an optional terminal configuration is specified. A dimension is included for the seating lugs, and a different method of dimensioning the locating lug is specified.

These changes do not affect interchangeability or performance of the lamps and are specified only to relieve unnecessary restrictions.

Effective date: December 23, 1975. Because the amendment creates no additional burden upon any person it is found for good cause shown that an immediate effective date is in the public interest.

(Sec. 103, 119, Pub L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51)

Issued on December 3, 1975.

James B. Gregory
Administrator

40 F.R. 59349
December 23, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 69-19; Notice 10)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to clarify the electrical terminal specifications for Type 1A rectangular headlamps.

Standard No. 108 was amended on November 30, 1973, (38 FR 33084) to specify requirements for rectangular headlamps that may be used as an option in a four-headlamp system. Figure 2 of the amended standard specifies certain interchangeability features of Type 1A and 2A rectangular headlamps, including location and arrangement of the electrical terminals. The three terminals shown in Figure 2 are designed as "ground," "lower beam," and "Type 2A upper beam." The terminal designated as "lower beam" is used as the terminal for the upper beam on Type 1A headlamps. This is implied by the notation, "no connection or terminal for Type 1A headlamp," under the phrase "Type 2A upper beam," since the ground is not a connection, but the figure may not be sufficiently clear on that point. In order to make it clear, this notice amends Figure 2 so that the "lower beam" terminal is redesignated as the "Type 2A lower beam or Type 1A upper beam" terminal.

It has also come to the attention of this agency that certain dimensional tolerances of Figure 2 are unnecessarily restrictive and that other methods of dimensioning are more applicable in certain cases. In addition, an optional terminal

configuration permitted for other headlamps is not currently included for the Type 1A and 2A headlamps.

Accordingly, Figure 2 is being revised to provide a tolerance change to the overall lamp width (6.58 inches) and height (4.20 inches). The lamp corner radius of 0.56 inch is changed to 0.54 inch, a terminal spacing of 0.333 inch is changed to 0.335 inch, and an optional terminal configuration is specified. A dimension is included for the seating lugs, and a different method of dimensioning the locating lug is specified.

These changes do not affect interchangeability or performance of the lamps and are specified only to relieve unnecessary restrictions.

Effective date: December 23, 1975. Because the amendment creates no additional burden upon any person it is found for good cause shown that an immediate effective date is in the public interest.

(Sec. 103, 119, Pub L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.51)

Issued on December 3, 1975.

James B. Gregory
Administrator

40 F.R. 59349
December 23, 1975

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment****(Docket No. 69-19; Notice 11)**

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, primarily to modify requirements applicable to turn signal lamps. The amendments are effective January 5, 1976.

Triangle Home Products has petitioned for immediate adoption of SAE Standard J588e, *Turn Signal Lamps*, September 1970, as the referenced standard for that item of lighting equipment. This change was originally proposed by NHTSA in Notice 3, Docket No. 69-19 (37 F.R. 22801). SAE J588e differs from J588d in several respects, the principal one being that the minimum effective projected luminous area of all turn signal lamps is 8 square inches. SAE J588d had divided turn signal lamps into two classes, A and B, but this no longer occurs in J588e. Class A turn signal lamps were those with a lens area not less than 12 square inches, while Class B were those whose minimum lens area was not less than 3.5 square inches. The amendment means that the minimum required luminous area of turn signals on passenger cars, and on other vehicles (except motorcycles) less than 80 inches in overall width, is increased to 8 square inches from 3.5 square inches, while that of larger vehicles is reduced to 8 from 12 square inches. The agency expects there to be no effect upon safety from this reduction as the photometric requirements are unchanged.

This proposal was not uniformly supported, several manufacturers objecting that the increase in minimum area from 3.5 square inches to 8 square inches was unnecessary, and suggesting 5 square inches instead. The NHTSA notes, however, that the SAE adopted J588e after many tests that demonstrated that the increase to 8

square inches, by providing more signal area, resulted in better estimation of the position of the signaling vehicle as seen by drivers of oncoming and following vehicles. Because of the increased photometrics for turn signal lamps that became effective January 1, 1970, it is difficult to manufacture lamps smaller than 8 square inches and produce the required light output. Finally, an area smaller than 8 square inches would increase the unit area intensity to a level that is likely to be distressing to many drivers. It is likely, however, in spite of the objections to the proposal that the industry conforms at present. The NHTSA surveyed the turn signal lens of 18 contemporary domestic and foreign passenger cars, finding no lens area less than 8 square inches, with the average at 14. However, the amendments permit continued compliance with J588d, on an optional basis, until September 1, 1978.

Notice 3 also proposed the adoption of updated SAE Standards, J585d and J586c, for tail lamps and stop lamps respectively. There were no objections to these proposals. The principal difference in the updated standards is the inclusion of definitions of and photometering instructions for multiple compartment lamps and multiple lamp arrangements. SAE J586c also establishes a minimum of 8 square inches for the effective projected luminous lens area of stop lamps, and, in a combination stop lamp-turn signal lamp, prohibits operation of the stop lamp while the turn signal is flashing. SAE J585d, in a change from J585c, requires measurement of photometrics not less than 10 feet from the photometer screen, the previous distance being a minimum of 4 feet. Because of these changes, the NHTSA is permitting continued compliance with J585c and J586b until September 1, 1978.

Effective: January 5, 1976

Accordingly, Standard No. 108 is being amended to incorporate the three new SAE Standards. Editorial amendments are also made to S4.1.1.6, S4.1.1.7, S4.1.1.12, S4.5.5 and S5.1 to conform them to the new requirements.

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is amended. . . .

Effective date: January 5, 1976. Because the effect of the amendments is to allow compliance with either the new or the existing requirements until September 1, 1978, an immediate effective

date imposes no additional burden on any person and is found for good cause shown to be in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.50)

Issued on December 23, 1975.

James B. Gregory
Administrator

41 F.R. 765
January 5, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 69-19; Notice 11)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, primarily to modify requirements applicable to turn signal lamps. The amendments are effective January 5, 1976.

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This proposal was not uniformly supported, several manufacturers objecting that the increase in minimum area from 3.5 square inches to 8 square inches was unnecessary, and suggesting 5 square inches instead. The NHTSA notes, however, that the SAE adopted J588e after many tests that demonstrated that the increase to 8

square inches, by providing more signal area, resulted in better estimation of the position of the signaling vehicle as seen by drivers of oncoming and following vehicles. Because of the increased photometrics for turn signal lamps that became effective January 1, 1970, it is difficult to manufacture lamps smaller than 8 square inches and produce the required light output. Finally, an area smaller than 8 square inches would increase the unit area intensity to a level that is likely to be distressing to many drivers. It is likely, however, in spite of the objections to the proposal that the industry conforms at present. The NHTSA surveyed the turn signal lens of 18 contemporary domestic and foreign passenger cars, finding no lens area less than 8 square inches, with the average at 14. However, the amendments permit continued compliance with J588d, on an optional basis, until September 1, 1978.

Notice 3 also proposed the adoption of updated SAE Standards, J585d and J586c, for tail lamps and stop lamps respectively. There were no objections to these proposals. The principal difference in the updated standards is the inclusion of definitions of and photometering instructions for multiple compartment lamps and multiple lamp arrangements. SAE J586c also establishes a minimum of 8 square inches for the effective projected luminous lens area of stop lamps, and, in a combination stop lamp-turn signal lamp, prohibits operation of the stop lamp while the turn signal is flashing. SAE J585d, in a change from J585c, requires measurement of photometrics not less than 10 feet from the photometer screen, the previous distance being a minimum of 4 feet. Because of these changes, the NHTSA is permitting continued compliance with J585c and J586b until September 1, 1978.

Effective: January 5, 1976

Accordingly, Standard No. 108 is being amended to incorporate the three new SAE Standards. Editorial amendments are also made to S4.1.1.6, S4.1.1.7, S4.1.1.12, S4.5.5 and S5.1 to conform them to the new requirements.

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is amended. . . .

Effective date: January 5, 1976. Because the effect of the amendments is to allow compliance with either the new or the existing requirements until September 1, 1978, an immediate effective

date imposes no additional burden on any person and is found for good cause shown to be in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1407; delegation of authority at 49 CFR 1.50)

Issued on December 23, 1975.

James B. Gregory
Administrator

41 F.R. 765
January 5, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment****(Docket No. 69-19; Notice 12)**

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, to allow conformance with SAE Standard J579c, "Sealed Beam Headlamp Units for Motor Vehicles", December 1974 as an option to compliance with the presently referenced SAE Standard J579a.

On October 25, 1972, the National Highway Traffic Safety Administration proposed (37 FR 22801) as part of a comprehensive rulemaking action that SAE Standard J579a, as currently referenced in Standard No. 108, be replaced by SAE Standard J579b. Except for the increased maximum candlepower (75,000 candlepower) specified in SAE Standard J579b, the commenters generally supported this proposal. SAE Standard J579c has added a definition of H-V axis and a description of rectangular sealed beam headlighting systems; otherwise it is identical to J579b.

SAE Standard J579c provides compatibility between headlight beam positions regardless of whether the headlamp is aimed by mechanical, optical, or visual methods, unlike SAE Standard J579a, which results in different beam positions if the lamp is aimed by mechanical methods instead of optical or visual methods. Since the headlamp beam position provided by the optical and visual aim methods is higher and results in greater seeing distance for the driver, the same improvement should be afforded by mechanical aim methods.

SAE Standard J579c contains minor changes in photometrics at certain test points which also provide improved lighting, but are of such a minor technical nature that allowance of these values would be a relief of a restriction. However, this amendment of Standard No. 108 restricts the maximum candlepower output, for the present time, to 37,500. The question of allowing the SAE maximum of 75,000 candlepower was raised in the notice of October 25, 1972, and will be considered in future rulemaking actions.

In consideration of the foregoing, amendments are made to 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108. . . .

Effective date: January 8, 1976. Because the amendment allows an option, relieves restrictions, and creates no additional burden on any person, it is found for good cause shown that an immediate effective date is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50)

Issued on January 5, 1976.

James B. Gregory
Administrator

41 F.R. 1483
January 8, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment****(Docket No. 69-19; Notice 12)**

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, to allow conformance with SAE Standard J579c, "Sealed Beam Headlamp Units for Motor Vehicles", December 1974 as an option to compliance with the presently referenced SAE Standard J579a.

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In consideration of the foregoing, amendments are made to 49 CFR § 571.108, Motor Vehicle Safety Standard No. 108. . . .

Effective date: January 8, 1976. Because the amendment allows an option, relieves restrictions, and creates no additional burden on any person, it is found for good cause shown that an immediate effective date is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50)

Issued on January 5, 1976.

James B. Gregory
Administrator

41 F.R. 1483
January 8, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment**

(Docket No. 69-19; Notice 14)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to provide identical wattage tolerances for headlamps with rectangular and circular lenses.

Standard No. 108 was amended on January 8, 1976 (41 FR 1483), to add S4.1.1.33 which provided, in subparagraph (c), an allowable tolerance of plus 7.5 percent for the maximum design wattage of headlamps with circular lenses that conform to SAE Standard J579c, *Sealed Beam Headlamp Units for Motor Vehicles*, December 1974. The question has been raised by Stanley Electric Co., Ltd., of Tokyo, Japan, and General Motors Corp. of Warren, Michigan, whether the same tolerance applies for the maximum design wattage of headlamps with rectangular lenses.

The answer is yes, and S4.1.1.21(b) is amended by this notice to provide an allowable tolerance of plus 7.5 percent for Type 1A and Type 2A headlamps. The 7.5 percent tolerance is the average actual maximum wattage (as opposed to design wattage) rating of headlamps listed in

Table 2 of SAE Standard J573d, *Lamp Bulbs and Sealed Units*, December 1968, as determined by multiplication of the maximum amperage times the design volts, and applies to all Type 1, Type 1A, Type 2 and Type 2A headlamps.

In consideration of the foregoing, subparagraph (b) of S4.1.1.21 is deleted and a new subparagraph (b) is added. . . .

Effective date: June 21, 1976. Because this amendment clarifies an existing requirement and creates no additional burden upon any person, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50.)

Issued on June 14, 1976.

James B. Gregory
Administrator

41 F.R. 24886
June 21, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment**

(Docket No. 69-19; Notice 14)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to provide identical wattage tolerances for headlamps with rectangular and circular lenses.

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In consideration of the foregoing, subparagraph (b) of S4.1.1.21 is deleted and a new subparagraph (b) is added. . . .

Effective date: June 21, 1976. Because this amendment clarifies an existing requirement and creates no additional burden upon any person, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50.)

Issued on June 14, 1976.

James B. Gregory
Administrator

41 F.R. 24886
June 21, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment****(Docket No. 75-8; Notice 5)**

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to allow use of a two-lamp rectangular headlamp system on motor vehicles manufactured on or after November 1, 1976.

On April 15, 1976, the agency proposed (41 FR 15870) that a system of two headlamps conforming to SAE Recommended Practice J1132—"142mm × 200mm Sealed Beam Headlamp Unit," January 1976, be used as an option in a two-headlamp system, and that applicable referenced and subreferenced SAE Standards and Recommended Practices not specifically included in SAE J1132 be those published in the 1976 SAE Handbook. A corrective notice was published on May 6, 1976 (41 FR 18687) clarifying that the headlamps would be "designed to conform" with J1132, consistent with other requirements for compliance of lighting equipment. The comments have received full consideration in adoption of this amendment.

The proposal was generally supported by vehicle and lighting manufacturers. Commenters indicated approval of the relief of a design restriction and the allowance of a greater choice of headlamps. Those who opposed the proposal commented that it might be difficult to obtain a replacement headlamp and that the 2-lamp rectangular system would complicate the supply-distribution network. Others commented that new mechanical aimers would be required for the two-lamp system.

In response to these comments, a study of the introductory period of the 4-lamp rectangular system demonstrated that replacement lamps were generally available, the supply-distribution network functioned as well as with older conventional headlamps, and that rectangular lamps

could be inspected and properly aimed as well as, if not better, than those with circular lenses. Although the 4-lamp system required development of a new mechanical aimer, the 2-lamp system will require only a simple adapter for the aimer.

Lamp manufacturers commented that the rectangular lamps may have more service performance difficulties than the circular types. However, unlike the 4-lamp system, the 2-lamp Type 2B system provides improved aim, about 15 percent higher photometrics in low beam performance, and up to 100 percent improvement in high beam performance.

In accordance with recently enunciated Department of Transportation policy encouraging adequate analysis of the consequences of regulatory action (41 FR 16200) the agency has evaluated the economic and other consequences of this action on the public and private sector, including possible loss of safety benefits. Since the system itself is an optional one, in one sense there is neither an adverse or positive economic impact. A Type 2B headlamp is expected to cost 150 percent of a conventional Type 2 headlamp but because of the improved photometrics of the lamp, the amendment should result in an overall benefit to safety.

The National Motor Vehicle Safety Advisory Council has not taken a position on the amendment.

In consideration of the foregoing a new paragraph S4.1.1.34 is added to 49 CFR 571.108, Motor Vehicle Safety Standard No. 108. . . .

Effective date: November 1, 1976. Because the amendment relieves a restriction and allows an optional means of compliance, it creates no additional burden upon any person. Accordingly, it

Effective: November 1, 1976

is found for good cause shown that an effective date earlier than 180 days after publication in the *Federal Register* is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50.)

Issued on October 13, 1976.

John W. Snow
Administrator

41 F.R. 46437
October 21, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 75-8; Notice 5)

This notice amends 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to allow use of a two-lamp rectangular headlamp system on motor vehicles manufactured on or after November 1, 1976.

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The proposal was generally supported by vehicle and lighting manufacturers. Commenters indicated approval of the relief of a design restriction and the allowance of a greater choice of headlamps. Those who opposed the proposal commented that it might be difficult to obtain a replacement headlamp and that the 2-lamp rectangular system would complicate the supply-distribution network. Others commented that new mechanical aimers would be required for the two-lamp system.

In response to these comments, a study of the introductory period of the 4-lamp rectangular system demonstrated that replacement lamps were generally available, the supply-distribution network functioned as well as with older conventional headlamps, and that rectangular lamps

could be inspected and properly aimed as well as, if not better, than those with circular lenses. Although the 4-lamp system required development of a new mechanical aimer, the 2-lamp system will require only a simple adapter for the aimer.

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The National Motor Vehicle Safety Advisory Council has not taken a position on the amendment.

In consideration of the foregoing a new paragraph S4.1.1.34 is added to 49 CFR 571.108, Motor Vehicle Safety Standard No. 108. . . .

Effective date: November 1, 1976. Because the amendment relieves a restriction and allows an optional means of compliance, it creates no additional burden upon any person. Accordingly, it

Effective: November 1, 1976

is found for good cause shown that an effective date earlier than 180 days after publication in the *Federal Register* is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50.)

Issued on October 13, 1976.

John W. Snow
Administrator

41 F.R. 46437
October 21, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108
Lamps, Reflective Devices, and Associated Equipment
(Docket No. 69-19; Notice 16)

This notice amends 49 CFR 571.108 Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, in minor respects.

This agency recently reviewed Motor Vehicle Safety Standard No. 108 and discovered five minor errors which this notice corrects. The first is an amendment of S4.1.1.4 to substitute SAE Standard J594e, "Reflex Reflectors," March 1970 as the referenced SAE Standard, a change inadvertently omitted when Table I and Table III were amended to incorporate J594e (37 FR 15514, August 3, 1972). The second corrects typographical errors in S4.1.1.17 that occurred in the republication of the standard on August 23, 1976 (41 FR 35522). The third is a correction of S4.3.1 which currently excludes "S4.3.1.8" from its applicability. There is no S4.3.1.8. The fourth amendment corrects a typographical error in S4.3.1.1.1 that also occurred in the republication of the standard. The final amendment substitutes "J593c, February 1968" in Table III as the referenced standard for backup lamps, in

place of "J593e, July 1972". This error initially occurred in "Volume 49 CFR Parts 200 to 999 revised as of October 1, 1975."

In consideration of the foregoing 49 CFR 571.108, Motor Vehicle Safety Standard No. 108 is amended as follows.

Effective date: November 1, 1976. Since the amendments are corrective in nature and impose no additional burden upon any person, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50.)

Issued on November 12, 1976.

John W. Snow
Administrator

41 F.R. 50826
November 18, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment

(Docket No. 69-19; Notice 16)

This notice amends 49 CFR 571.108 Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, in minor respects.

This agency recently reviewed Motor Vehicle Safety Standard No. 108 and discovered five minor errors which this notice corrects. The first is an amendment of S4.1.1.4 to substitute SAE Standard J594e, "Reflex Reflectors," March 1970 as the referenced SAE Standard, a change inadvertently omitted when Table I and Table III were amended to incorporate J594e (37 FR 15514, August 3, 1972). The second corrects typographical errors in S4.1.1.17 that occurred in the republication of the standard on August 23, 1976 (41 FR 35522). The third is a correction of S4.3.1 which currently excludes "S4.3.1.8" from its applicability. There is no S4.3.1.8. The fourth amendment corrects a typographical error in S4.3.1.1.1 that also occurred in the republication of the standard. The final amendment substitutes "J593c, February 1968" in Table III as the referenced standard for backup lamps, in

place of "J593e, July 1972". This error initially occurred in "Volume 49 CFR Parts 200 to 999 revised as of October 1, 1975."

In consideration of the foregoing 49 CFR 571.108, Motor Vehicle Safety Standard No. 108 is amended as follows.

Effective date: November 1, 1976. Since the amendments are corrective in nature and impose no additional burden upon any person, it is found for good cause shown that an effective date earlier than 180 days after issuance is in the public interest.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50.)

Issued on November 12, 1976.

John W. Snow
Administrator

41 F.R. 50826
November 18, 1976

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment****(Docket No. 71-19; Notice 06)****(Docket No. 75-32; Notice 02)**

This notice responds to petitions for reconsideration of the newly established Standard No. 120, *Tire Selection and Rims for Motor Vehicles Other Than Passenger Cars*, by amendments to the standard in the areas of tire and rim selection, rim marking, and tire label information. A minor amendment of Part 567, Certification," is also made. In addition, the decision that the agency no longer regulates mobile structure trailers (mobile homes) is also set forth, along with appropriate conforming amendments of Standard No. 120, Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, and § 71.3, *Definitions*, of Part 571.

Standard No. 120 (49 CFR 571.120) establishes that multipurpose passenger vehicles (MPV's), trucks, buses, motorcycles, and trailers shall be equipped with tires and rims that are adequate to support the fully-loaded vehicle under contemplated operating conditions. The legislative history of the National Traffic and Motor Vehicle Safety Act (the Act) (15 U.S.C. 1381, *et seq.*) and § 202 of that Act establish Congress' concern that motor vehicles could be equipped with inadequate tires and that regulation would be necessary to protect against this problem:

Sec. 202. In standards established under title I of this Act the Secretary shall require that each motor vehicle be equipped by the manufacturer or by the purchaser thereof at the time of the first purchase thereof in good faith for purposes other than resale with tires which meet the maximum permissible load standards when such vehicle is fully loaded with the maximum number of passengers it is designed to carry and a reasonable amount of luggage.

Standard No. 120 was promulgated January 19, 1976 (41 FR 3478, January 26, 1976), and 17 petitions for reconsideration of particular provisions were filed by vehicle, tire, and rim manufacturers, and by trade associations representing these manufacturers. In view of the length of time that has been taken to respond to these petitions for reconsideration, the effective dates for implementation of several of the standard's provisions were delayed (41 FR 18659, May 6, 1976) (41 FR 36657, August 31, 1976). The standard's basic provision for tire and rim selection (S5.1) was not delayed and became effective September 1, 1976.

Tire and rim selection. The primary effect of Standard No. 120 is fulfillment of § 202 of the Act by specification of the minimum load-carrying characteristics of tires on motor vehicles not already subject to the passenger care tire and rim selection requirements of Standard No. 110, *Tire Selection and Rims*, of Part 571. The rim selection requirements of the standard are limited (use of a rim designated as suitable by the tire manufacturer for use with its product; use of "DOT" labeled rims on and after September 1, 1979) in anticipation of more comprehensive regulation of rims as part of an upcoming wheel standard.

Tire selection consist of two elements: With one exception, each vehicle must be equipped with tires that comply with Standard No. 119, *New Pneumatic Tires for Vehicles Other than Passenger Cars* (or Standard No. 109, *New Pneumatic Tires*), and the load rating of the tires on each axle of the vehicle must together at least equal the gross axle weight rating (GAWR) for that axle. The term GAWR is defined in § 571.3 of Part 571 as ". . . the value specified

by the vehicle manufacturer as the load-carrying capacity of single axle system, as measured at the tire-ground interfaces." The GAWR concept formalizes the decision each manufacturer makes about the load-bearing ability of the tires, rims, axle, brakes, and suspension components (at a minimum) chosen to support and control the loaded vehicle.

The Truck Equipment Body Distributors Association (TEBDA) questioned the requirement that, with one exception, each vehicle subject to Standard No. 120 be equipped with tires that conform to Standard No. 119 (or Standard No. 109). TEBDA's March 17, 1976, letter concerned certification of trucks equipped for agricultural service with Goodyear "Terra-Tires." The "Terra-Tire" is one example of tires that are placed on specialized motor vehicles which operate both on and off the highway. The tires are specially designed and are unable to be certified to either of the tire performance standards.

Section S5.1.1 specifies that "each vehicle equipped with pneumatic tires for highway service shall be equipped with tires that meet the requirement of [the tire] standard[s]" This language is intended to exclude from the requirement for Standard 119 (or 109) tires those vehicles which the manufacturer (or person later in the chain of distribution) decides to equip with tires other than "tires for highway service." The decision is left with the manufacturer at this time in view of the absence of data that demonstrates problems in the use of these tires that would justify their elimination. Any pattern of accident occurrence that points to unsafe utilization of non-highway service tires would presumably constitute a safety-related defect and could lead to revision of Standard No. 120 to regulate them. At this time, the answer to TEBDA is that the tire selection requirements of S5.1.1, and S5.1.2 as a logical extension of S5.1.1) would not apply to a vehicle equipped with non-highway service tires. It is emphasized that this exclusion from Standard No. 120 bears no direct relationship to the determination of whether a particular vehicle qualifies as a "motor vehicle" as that term is defined in § 102(3) of the Act.

The second requirement for tire selection (S5.1.2) is that "[t]he sum of the maximum load ratings of the tires fitted to an axle shall be not less than the gross axle weight rating (GAWR) of the axle system. . . ." Comparable further specification exists when multiple ratings appear on the certification label, or the tires used on the vehicle are not listed on the certification label.

Because no petition directly raised objections to the requirements of S5.1.2, the agency first addresses issues raised in a separate and outstanding NHTSA proposal dealing with tire choice and its relationship to GAWR. The action (Definition of "Gross Axle Weight Rating," 40 FR 58152, December 15, 1975) proposed that the GAWR determination be based on, among other things, the vehicle's maximum attainable speed or the maximum load rating of the tire established by the tire manufacturer at 60 mph, whichever is lower. The proposed modification was intended to reflect the industry practice of assigning (in most cases) and labeling (in accordance with Standards 119 and 109) a tire's basic load-carrying capabilities in recognition of the unrestricted highway speeds to which it is normally exposed. This formalization of GAWR determination was intended to prevent manufacturers from assigning higher capabilities to tires than their 60-mph ratings, based on arbitrarily low speeds.

Most comments supported the GAWR proposal, although several truck manufacturers asked that the term "maximum attainable speed" be specifically defined as it is elsewhere in NHTSA regulations. Ford Motor Company opposed the proposed change in the definition of GAWR as an arbitrary selection of only one of the many criteria that enter into the determination of GAWR. The company suggested that other means exist to prevent assignment of arbitrary GAWR's based on tire ratings other than those established at 60 mph and so labeled on the tire sidewall.

The NHTSA agrees with Ford and notes that the "other means" to regulate this practice exist in the tire selection requirements of S5.1.2 of Standard No. 120. At the time of the GAWR proposal, Standard 120 had not been made final. Since its implementation on September 1, 1976,

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108**Lamps, Reflective Devices, and Associated Equipment**

(Docket No. 71-19; Notice 06)

(Docket No. 75-32; Notice 02)

This notice responds to petitions for reconsideration of the newly established Standard No. 120, *Tire Selection and Rims for Motor Vehicles Other Than Passenger Cars*, by amendments to the standard in the areas of tire and rim selection, rim marking, and tire label information. A minor amendment of Part 567, Certification," is also made. In addition, the decision that the agency no longer regulates mobile structure trailers (mobile homes) is also set forth, along with appropriate conforming amendments of Standard No. 120, Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, and § 71.3, *Definitions*, of Part 571.

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a manufacturer is free to determine GAWR as in the past, but the maximum load ratings (marked on the tire sidewall) of tires on the vehicle must at least equal the GAWR listed. For this reason, the NHTSA's proposal for amendment of the GAWR definition is considered unnecessary and is therefore withdrawn. Further notice and opportunity for comment will precede any further action on the proposal set forth in that notice.

Several issues were raised in regard to the GAWR proposal that should be addressed for purposes of clarification. The Heavy & Specialized Carriers Conference of the American Trucking Associations (HSCC) cautioned the NHTSA against requiring an "unrestricted speed GAWR" on the Part 567 certification label in view of two State laws (or regulations) that no vehicle can operate on the state highways at gross vehicle weights greater than those listed on the vehicle in accordance with Federal regulations. It is common practice to load some "heavy hauler" vehicles to a gross vehicle weight that exceeds the unrestricted speed ratings of the vehicle tires, because the vehicle's tires are capable of carrying greater weight at reduced speeds.

As issued, Standard No. 120 required that the maximum load ratings of the tires at least equal the GAWR. This effectively limits the GVWR to the sum of these GAWR's (except in the case of semi-trailers). In the agency's view, however, the problem cited by HSCC can be avoided by listing additional GAWR's (calculated for reduced speed operation) at the end of the certification plate following the required data on the label. This practice has been followed by members of the Truck Trailer Manufacturers Association (TTMA) and was confirmed as permissible by the NHTSA in a March 5, 1975, letter to the TTMA. In order to aid resolution of issues that may arise between States that wish to refer to the certification label and operators that wish to continue the additional rating system, the agency hereby makes an interpretive amendment to Part 567 to specify where additional ratings may appear.

Based on this understanding of the relationship between choice of tires under S5.1.2 of

Standard No. 120 and the determination of GAWR under § 567.4 of Part 567, a modification of the requirements of Standard No. 120 is justified. In the case of a vehicle that is incapable of the 60-mph speed used by tire manufacturers to establish the maximum load rating that is stamped on the tire sidewall (typically a powered vehicle and not a trailer), it would not be reasonable to require the GAWR's to be strictly limited to the sum of the maximum load ratings of the tires on the vehicle. This is because the vehicle will never achieve the speeds for which maximum load ratings were established. In many cases, provision is made to rate tires for a greater load at the lower (but maximum) speed of which a vehicle is capable. In recognition of this extremely limited specialized situation, the agency amends S5.1.2 to permit installation of tires with reduced speed capabilities in the case of vehicles whose maximum attainable speed is not greater than 50 mph. This amendment is considered to be a technical adjustment of language to fully implement the intent of the final rule as that was established. A separate amendment of § 571.3 is made to establish the basis for determination of a vehicle's maximum attainable speeds.

Volkswagen raised a separate issue concerning the requirement that the sum of maximum load ratings at least equal the GAWR of the axle system. This provision, in the case of an MPV, truck, bus, or trailer that is equipped with passenger car tires, requires that the maximum load ratings on the tires be reduced by approximately 10 percent before calculating the sum. The purpose of this 10-percent reduction in tire rating is to account for the generally harsher treatment (impulse and surge loading in the case of MPV's off-road) to which the tires of a vehicle other than a passenger car are exposed that is not accounted for in passenger car tire ratings. Volkswagen requested data showing that MPV's actually experience more abusive treatment in use.

The MPV category is based in part on the existence of characteristics that make these vehicles less amenable to passenger car standards. If Volkswagen has data indicating that the two categories actually experience identical usage, the

NHTSA would prefer to adjust the definition to ensure that these vehicles are subject to all passenger car standards. Until that time, the existing rationale for excusing these vehicles from some passenger car standards dictates the use of higher strength tires.

As earlier noted, the rim selection requirements of Standard No. 120 are not substantial, consisting of a requirement that the rims be listed by the tire manufacturer as suitable for use with its tires, and a requirement that, on and after September 1, 1979, the rims used on a vehicle be labeled as specified in S5.2 of the standard. The September 1, 1979, date for use of labeled rims replaced a March 1, 1977, date that proved impractical in view of large inventories of unlabeled rims that exist and will exist long after rim labeling is begun. In establishing the later effective date, the agency noted that it was considering the possibility of eliminating this requirement entirely, to simplify the phase-in of properly marked rims as they become available. Experience with phase-in of newly regulated equipment in other areas such as tires and brake hoses has demonstrated that the requirement for labeled equipment on and after a particular date can create substantial inventory and potential economic waste problems. In view of experience that the delay of labeling requirements has not substantially impeded certification verification and defect actions, the NHTSA has decided to withdraw the requirement (that appears as the last sentence of S5.1.1). It is noted that withdrawal of this requirement does not affect the requirement of S5.1.2 that rims be listed as suitable by the tire manufacturer for use with the tires that equip the vehicle, or the requirement of S5.2 that rims be labeled with specified information.

Mobile structure trailers. With regard to the applicability of this standard and other standards as a general matter, the NHTSA takes this opportunity to publish in the *Federal Register* its conclusion that enactment of the National Mobile Home Construction and Safety Standards Act of 1974 (42 U.S.C. 5401 et seq.) (the Mobile Home Act) impliedly repealed this agency's authority to regulate mobile homes. This conclusion was announced in a May 5, 1976,

letter to the Department of Housing and Urban Development that stated in relevant part:

The National Mobile Home Construction and Safety Standards Act of 1974 (42 U.S.C. 5401 et seq.) (the "Mobile Home Act") established within the Department of Housing and Urban Development a comprehensive program for the regulation of mobile homes. We have concluded that one result of that statute's enactment was the implied repeal of the NHTSA's authority with respect to mobile homes. Accordingly, we consider that the enactment has the effect of amending the Vehicle Safety Act's definition of "motor vehicle" to exclude "mobile homes" as the latter term is defined in the Mobile Home Act.

The effect of this conclusion is that tire and rim selection for mobile homes (known as "mobile structure trailers" by the NHTSA) is no longer subject to Standard No. 120 or other regulations issued under authority of the Act. For this reason, references to "mobile structure trailer" in Standard No. 120, Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, and the general definitions section of Part 571 (§ 571.3) are deleted.

On the same subject, a May 25, 1976 (and supplementing July 7, 1976), letter from Firestone to the NHTSA asked whether tires manufactured exclusively for mobile homes and tires that are used on mobile homes (although manufactured for other uses) are subject to regulation under the Act. Similar questions were raised as to the status of rims, some of which are designed exclusively for use on mobile homes and some of which are used on mobile homes and other vehicles.

As for tires, Standard No. 109 applied to "tires for use on passenger cars" and Standard No. 119 applies to "tires designed for highway use on [specified motor vehicles]." By these terms, neither standard applies to tires designed exclusively for use on mobile homes. In the case of tires actually used on mobile homes but designed for use also on vehicles subject to the Act, the agency considers such tires to be subject to the standard's requirements because they con-

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stitute motor vehicle equipment as that term is defined in § 102(4) of the Act.

As for rims, Standard No. 110 contains specifications only for rims that equip passenger cars and therefore contains no requirements that would directly require performance of a rim that was installed on a mobile home. Standard No. 120 applies to rims "for use on" MPV's, trucks, buses, motorcycles, and trailers (other than mobile structure trailers) and therefore would not apply to rims designed exclusively for use on mobile homes. In the case of rims designed for use on any of the motor vehicle types listed, the NHTSA would consider Standard No. 120's requirements applicable, and labeling in accordance with S5.2 would be required.

Rim marking. The second requirement of Standard No. 120 is an equipment requirement specifying five items of information (six in the case of multipiece wheels) that must appear on any rim for use on MPV's, trucks, buses, trailers, or motorcycles. The requirements for location of the information varies according to the type of information and whether the rim is part of a single or multipiece wheel. In answer to a question raised by Kelsey-Hayes and Motor Wheel, it is confirmed that these marking requirements have no bearing on the use of the rim on passenger cars, except as future labeling requirements in Standard No. 110 might prohibit one or more of the items required by S5.2. This eventually is considered to be extremely unlikely.

Based on a comprehensive review of the petitions for reconsideration, the agency has decided that some requested modifications in labeling requirements are justified. The Japanese Automobile Manufacturers Association and Suzuki asked that required labeling be permitted to be embossed as well as impressed on the rim. Volkswagen (and representatives from Motor Wheel and Goodyear in a February 4, 1976, meeting with the NHTSA) asked that rim labeling be permitted on the disc portion of a single-piece wheel. The agency considers these suggestions to constitute justifiable options that would not diminish the level of motor vehicle safety represented by the standard, and the standard is accordingly amended.

Motor Wheel requested amendment of the standard to state that labeling of multipiece rims is permitted in the bolt hole area. The agency does not consider the addition of advisory information to be a desirable drafting practice because the mention of bolt hole locations would imply that some restriction on location exists when in fact it does not. In answer to another question from Motor Wheel, more than one "rim type designation" on rim components of a multipiece wheel is permitted by the standard.

Motor Wheel and Goodyear also asked if numbers that contain decimals or "trailing zeros" (e.g., 7.50) could be shortened by deleting the decimal and "trailing zero." The agency believes that abbreviation by dropping the zero will not be confusing and amends the standard to include an example of such abbreviation. Confusion would result from dropping the decimal.

In response to a request by Motor Wheel and Budd Company for a specific provision in S5.1.2 that the marking requirements only apply to newly manufactured wheels, the agency notes the general applicability statement in § 571.7, governing the applicability of all standards found in Part 571, states that ". . . each standard set forth in subpart B of this part applies according to its terms to all motor vehicles or items of motor vehicle equipment the manufacture of which is complete on or after the effective date of the standard." Thus, the standard only applies to rims manufactured on or after the effective date of S5.2.

Manufacturers asked for several revisions of the marking requirements which the agency has considered and concludes are unjustified. This discussion treats the requests in the order that the markings in question appear in S5.2.

With regard to the requirement for marking with a designation that indicates the source of the rim's published dimensions (S5.2(a)), Daido Corporation asked whether the Japanese Industrial Standards' symbol (a stylized combination of the letters J, I, and S) or the letters "JIS" would meet the requirements of S5.2(a)(3) for use of letter "J." The agency interprets its labeling requirements as strictly as any other portion of its requirements and concludes that neither "JIS" nor the JIS symbol would con-

form to the requirement of S5.2(a)(3). In response to a similar request by Volkswagen to permit "DIN" in place of "D," the agency has considered the idea of permitting the manufacturer the option of a choice of designations, and concludes they are undesirable in the interest of maintaining uniformity and comprehension.

Grove Manufacturing suggested that the single letter designations of "D" and "E" could be mistaken for the load ranges that appear on tires and on the certification label. The agency concludes that the designations on the rim are sufficiently separated to preclude confusion and therefore the recommendation by Grove is not undertaken.

The "rim size designation" required by S5.2(b) is defined in S4 to mean the rim diameter and width. Daido and Volkswagen asked that a width designation followed by a diameter designation be considered as satisfying the requirement for designation of diameter and width. The agency specified the existing order to distinguish rim designations from tire designations. This order of information is being considered as the uniform practice to be adopted by the International Standards Organization. For reasons of uniformity, the requests are denied.

Volkswagen asked that the "DIN" symbol be permitted to signify compliance of the rim with Standard No. 120 in place of the "DOT" symbol required by S5.2(c) for this purpose. The agency does not find that the requirement of § 114 of the Act for certification is satisfied by use of a designation that has a wholly different meaning. Volkswagen's request is therefore denied.

Certification label. The third requirement of Standard No. 120 is that information about suitable tires and rims for use on the vehicle, along with appropriate inflation pressure and speed restriction information, be placed on a label on the vehicle (S5.3). As amended April 29, 1976 (41 FR 18659, May 6, 1976), the standard requires that the information appear on the certification labels of vehicles manufactured on or after September 1, 1977.

Some manufacturers and the Truck Trailer Manufacturers Association (TTMA) objected to the provision of this information on grounds

that valid information already appears on the tires and rims that equip the vehicle, and that the information could mislead a person to think that only the listed tires and rims could be used on the vehicle. With regard to the first objection, the NHTSA disagrees and notes that an improper choice of tires or rims (as could occur by replacing original equipment with "custom" rims or the equivalent in tires) could permanently mislead vehicle owners as to the suitable selection of tires and rims. As for the possibility of misleading, the agency believes that a heading over the tire-rim listings (specifically, "SUITABLE TIRE-RIM CHOICE") can be added to the requirements for optional use by a manufacturer who believes the information would be otherwise misleading. With regard to General Motors' note that an owner should be guided by all available information on tire choice (e.g., information in the owner's manual), the agency notes its longstanding position that manufacturers may add statements referring the reader to other publications for additional information.

It is apparent from the examples cited by manufacturers that the decision to place all required data on the certification label could prove cumbersome in some cases, particularly those involving a heavy truck with several available axle combinations. In view of these problems, the agency has decided to remove the restriction on location and permit the information to appear on the certification label or on a separate label that conforms to the requirements for certification labels. The NHTSA notes that this option to provide information on a separate label responds to concern of the Truck Body and Equipment Association (TBEA) for the responsibilities of its final-stage manufacturing membership. The agency does not believe the tire and rim information would be as useful in a location entirely separate from the certification label, and it therefore declines to adopt General Motors' suggestion to use the Vehicle Identification label.

Motorcycle manufacturers and General Motors pointed out that the requirements for listing tire and rim information after GVWR in the case of vehicles, such as motorcycles, that only utilize one GVWR listing, is redundant and therefore wasteful of space. Other manufacturers sug-

stitute motor vehicle equipment as that term is defined in § 102(4) of the Act.

As for rims, Standard No. 110 contains specifications only for rims that equip passenger cars and therefore contains no requirements that would directly require performance of a rim that was installed on a mobile home. Standard No. 120 applies to rims "for use on" MPV's, trucks, buses, motorcycles, and trailers (other than mobile structure trailers) and therefore would not apply to rims designed exclusively for use on mobile homes. In the case of rims designed for use on any of the motor vehicle types listed, the NHTSA would consider Standard No. 120's requirements applicable, and labeling in accordance with S5.2 would be required.

Rim marking. The second requirement of Standard No. 120 is an equipment requirement specifying five items of information (six in the case of multipiece wheels) that must appear on any rim for use on MPV's, trucks, buses, trailers, or motorcycles. The requirements for location of the information varies according to the type of information and whether the rim is part of a single or multipiece wheel. In answer to a question raised by Kelsey-Hayes and Motor Wheel, it is confirmed that these marking requirements have no bearing on the use of the rim on passenger cars, except as future labeling requirements in Standard No. 110 might prohibit one or more of the items required by S5.2. This eventually is considered to be extremely unlikely.

Based on a comprehensive review of the petitions for reconsideration, the agency has decided that some requested modifications in labeling requirements are justified. The Japanese Automobile Manufacturers Association and Suzuki asked that required labeling be permitted to be embossed as well as impressed on the rim. Volkswagen (and representatives from Motor Wheel and Goodyear in a February 4, 1976, meeting with the NHTSA) asked that rim labeling be permitted on the disc portion of a single-piece wheel. The agency considers these suggestions to constitute justifiable options that would not diminish the level of motor vehicle safety represented by the standard, and the standard is accordingly amended.

Motor Wheel requested amendment of the standard to state that labeling of multipiece rims is permitted in the bolt hole area. The agency does not consider the addition of advisory information to be a desirable drafting practice because the mention of bolt hole locations would imply that some restriction on location exists when in fact it does not. In answer to another question from Motor Wheel, more than one "rim type designation" on rim components of a multipiece wheel is permitted by the standard.

Motor Wheel and Goodyear also asked if numbers that contain decimals or "trailing zeros" (e.g., 7.50) could be shortened by deleting the decimal and "trailing zero." The agency believes that abbreviation by dropping the zero will not be confusing and amends the standard to include an example of such abbreviation. Confusion would result from dropping the decimal.

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gested that the tire-rim information was redundant in the case of multiple GVWR listings, although this is not the case because of the need to associate the appropriate GVWR with GAWR's that may exceed the GVWR. In any event, these comments suggest that GVWR and GAWR could be better linked by revision of the example format to reduce the amount of information that must be listed. The solution is to permit listing of the GVWR alone, followed immediately by corresponding GAWR's and appropriate tire-rim information. The clearer format would be used for single and multiple listings. This revision is described in the new example that accompanies the rule changes at the end of this notice. In conformity with this simplification, the rule is also amended to delete the requirements for GVWR tire-rim-inflation-listings. Depending on manufacturers' reactions to the simplified format, a similar change could be undertaken for the passenger car example found in Part 567 (§ 567.4(h)(1)).

With regard to the items of information that must be listed in accordance with S5.3, General Motors and the TTMA argued that "tires . . . appropriate *as a minimum* for the GAWR" [emphasis added] could be construed to require tires with load rating less than those that the manufacturer would choose to recommend. To eliminate any ambiguity, the agency replaces "at a minimum" with "as specified by S5.1.2".

Suzuki asked whether "cold inflation pressure" means the maximum inflation pressure specified by the tire manufacturer. The TTMA also asked for clarification on this point. The answer is that the requirement does not call for maximum pressure, but the pressure specified by the tire manufacturer as sufficient to carry the load specified by the vehicle manufacturer as the tire's share of the assigned GAWR.

Michelin Tire Corporation noted that listing inflation pressure could be misleading in the case of tire designations that call for different inflation pressures depending on the tire construction. It is the agency's view that any possibility of confusion can easily be avoided by an indication that the tire designation represents a radial tire, so that a person substituting a non-radial tire size with the same designation is aware that the two tires are not identical.

The TBFA requested clarification of the term "maximum speed" as it appeared in the example that accompanied the final rule. The TBFA appeared to misunderstand the example as a reference to the speed capabilities of the vehicle instead of speed restriction of the tires. The agency has in mind only the rare tire types constructed for transit buses and mining and logging operations and so designated. Goodyear and the TTMA appeared to have the same mistaken impression of the requirement.

Speed-restricted vehicles have now been addressed under S5.1.2. In view of the confusion that arose over the requirement, and the agency's assumption that the users of these tires are knowledgeable in the use of the tires, it has been decided to drop the requirement of S5.3(d) altogether.

The TTMA raised several other questions with regard to the information that appears along with the GAWR. In answer to these questions, the effective dates of the standard are such that the manufacturer will be required to list the information specified by S5.3 on and after September 1, 1977. Also, it is not permissible to "bracket" the GVWR and GAWR values for a particular vehicle by specifying the minimum and maximum values that any tire-rim choice could provide. Section 567.4 of Part 567 requires that the GVWR and GAWR's representing the manufacturer determination of the particular vehicles' characteristics must be listed.

The standard does not require the information specified in S5.3 to be listed alongside the additional GVWR's and GAWR's that a manufacturer might list at the end of its certification label as reduced speed ratings. Lastly, the agency does not agree that the GAWR ratings for a semi-trailer are not related to the trailer's GVWR. While the trailer's axles do not support the entire weight of the vehicle, it is still the case that the various GVWR's that could be assigned to a semi-trailer are affected by the GAWR values that can be assigned, and that the GVWR probably differs depending on the GAWR value assigned. In this sense the GAWR's assigned to a semi-trailer's axles do "correspond" to its GVWR.

In accordance with Department of Transportation policy encouraging adequate analysis of the consequences of regulatory action (41 FR 16200, April 16, 1976), the agency herewith summarizes its evaluation of the economic and other consequences of this action on the public and private sectors, including possible loss of safety benefits. The new options, simplification, and reduction of marking and labeling requirements should make compliance with the standard less costly, while the changes are not expected to significantly reduce the level of motor vehicle safety. The exception for speed-restricted vehicles provided in S5.1.2 represents a correction of the requirements to reflect the agency's intent not to prevent the assignment of greater load-carrying capabilities to vehicles at lower speeds. Permitting this practice to continue will result in the avoidance of new costs in the economy.

In consideration of the postponement of effective dates already granted for rim marking and the tire information labeling, the agency concludes that the present effective date schedule permits adequate time for compliance.

In view of the three notices that have modified the text of Standard No. 120, the entire standard (incorporating the amendments made by this notice) is published for the convenience of persons affected.

In consideration of the foregoing, Chapter V of Title 49, Code of Federal Regulations, is amended

Effective date: Changes to the text of the Federal Register may be made immediately. The provisions of Standard No. 120 are in effect at this time, except as otherwise provided in the standard.

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50)

Issued on January 28, 1977.

John W. Snow
Administrator

42 F.R. 7140
February 7, 1977

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Motor Vehicle Lighting

(Docket No. 77-5; Notice 2)

This notice was preceded by a notice of proposed rulemaking issued pursuant to a petition for rulemaking. It amends color specifications for motor vehicle signaling devices. This change is adopted to facilitate manufacturer conformance with OSHA requirements. The change slightly modifies the acceptable color coordinates for yellow (amber).

Effective date: January 1, 1979, with optional compliance permitted as of the date of publication of this amendment in the Federal Register.

For further information contact:

Bill Eason, Office of Vehicle Safety Standards, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590 (202-426-2720).

Supplementary information: On October 25, 1976, the General Electric Company (GE) petitioned for an initiation of rulemaking to amend Federal Motor Vehicle Safety Standard No. 108 to substitute SAE Standard J578b, "Color Specification for Electric Signal Lighting Devices," September 1974, as the color standard for motor vehicle lighting equipment. GE has been confronted with an OSHA proposal to lower the maximum permissible level of arsenic used in glass making, and on that basis intended to eliminate arsenic entirely from its production. Clear glass made with a substitute

for arsenic apparently absorbs yellow dye in a manner that differs from glass made with arsenic, with the result that yellow light emitted through it no longer conforms to the color coordinates for yellow (amber) of SAE J578a, but would be within those for J578b. The NHTSA deferred immediate action because of the imminence of SAE J578c which contains color coordinates that are internationally accepted. On February 10, 1977, GE modified its petition, asking only for a definition of the color yellow (amber) identical to that specified in J578c.

Notice of the proposal was published on June 30, 1977, and an opportunity afforded for comment (942 F.R. 33354). Seven comments were received on the proposal, all of which concurred with it. The amendment is therefore adopted.

In consideration of the foregoing paragraph S4.1.5 of 49 CFR 571.108, Motor Vehicle Safety Standard No. 108 is amended. . . .

(Sec. 103, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1302, 1407); delegation of authority at 49 CFR 1.50)

Issued on June 8, 1978.

Joan Claybrook
Administrator

43 F.R. 25822-25823
June 15, 1978

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Motor Vehicle Lighting

(Docket No. 78-5; Notice 3)

Action: Final rule.

Summary: This notice establishes an alternate performance standard for most motor vehicle headlamps which would allow candlepower output on the upper beam to be double the amount currently permitted. It also establishes a marking code for identification and certification of the new headlamps. It also requires that headlamps be adjustable without the necessity of removing trim rings or other ornamental parts. The amendment is issued under the National Traffic and Motor Vehicle Safety Act which requires the issuance of appropriate safety standards. This standard will allow the production of headlamps, both as original and aftermarket equipment, that provide the driver with an increase in seeing distance, and that are marked to insure compatibility of replacement.

Effective dates: The photometric portion of the amendment is effective upon publication in the FEDERAL REGISTER. Lens marking and certification requirements are effective July 1, 1979. The headlamp adjustability requirement is effective October 1, 1979.

For further information contact:

Bill Eason, Office of Rulemaking, National Highway Traffic Safety Administration, Washington, D.C., 202-426-2720.

Supplementary information: On February 23, 1978, the NHTSA published in 43 FR 7451 a notice of proposal rulemaking (NPRM) that would reduce accidents on the Nation's streets and highways by allowing the production of motor vehicle headlamps with greater light output. The proposal was issued in response to petitions for rulemaking submitted

by GTE, Sylvania, General Motors Corp., Koito Manufacturing Co. Ltd. and General Electric Co.

Federal Motor Vehicle Safety Standard No. 108 (49 CFR 571.108), *Lamps, Reflective Devices and Associated Equipment*, requires motor vehicles other than motorcycles to be equipped with a headlighting system that meets, among other specifications, minimum and maximum photometric output values specified by the Society of Automotive Engineers in SAE Standard J579a, Sealed Beam Headlamp Units for Motor Vehicles, August 1965. Under this standard, the maximum candlepower (cp) of headlamps in operation on motor vehicles shall not exceed 75,000. The SAE revised its standard in December 1974 (J579c), one effect of which was to raise the system total output ceiling to 150,000 cp. Shortly thereafter NHTSA added paragraph S4.1.1.33 to Standard No. 108 to allow manufacturers to comply with J579c if they wished, provided that the ceiling imposed by J579a was not exceeded. NHTSA's amendment also imposed maximum design wattage limitations at 12.8 volts. These standards apply to traditional headlamp systems with circular lenses and to a newer system consisting of four lamps with rectangular lenses. When SAE adopted Recommended Practice J1132 "142 mm x 200mm Sealed Beam Headlamp Unit", in January 1976, establishing specifications for a two-lamp rectangular headlamp system, NHTSA added S4.1.1.34, effective November 1, 1976, allowing this system, without imposing additional candlepower output restrictions. The reason for this regulatory anomaly with NHTSA's intent to raise the candlepower ceiling on the three other headlighting systems within the near future (now accomplished by this amendment) and the desire

not to impose a limitation on manufacturers of the newest system which would be in effect for only a relatively short time. NHTSA research has demonstrated that an increase in photometrics to a maximum of 150,000 cp will enhance seeing ability without any significant increase in glare from properly aimed headlights, but that photometric output exceeding 150,000 cp results in only a marginal increase in visibility with an increase in glare.

In addition, NHTSA proposed establishment of a marking code to be embedded in the lens of each headlamp designed to comply with SAE J579c to enable the agency to determine with ease which version of Standard No. 108 applies to the headlamp, as well as enabling a consumer to replace original equipment headlamps with lamps of compatible photometric output. A marking system identifying headlamps as type "1A", etc. currently exists. The new proposed code consists of three characters. The first is a number indicating the number of beams produced by the lamp, i.e., 1 or 2. The second character is a letter indicating whether the headlamp is a large or small rectangular or circular headlamp. The final character indicates the version, or requirement, of Standard No. 108 which apply to the lamp. For the present this will be "1", until requirements change to the extent that a new identification number is required, as it is anticipated that future headlighting systems may have different wattages, beam patterns and other characteristics and could not serve as replacements for J579c headlamps.

The agency proposed that types 1A, 2A, and 2B would retain their present nomenclature (plus the final digit), while 5¾ inch diameter (146 mm diameter) headlamps will be identified by the letter "C", and 7 inch diameter lamps (178 mm diameter) with the letter "D". Thus, a Type 2D1 headlamp would be the new identification for a Type 2 (7 inch) headlamp permitted a maximum candlepower output of 75,000. Also on the lens, at a location of the manufacturer's choosing, would be the letters "DOT" certifying compliance with requirements of Standard No. 108. Manufacturers wishing to manufacture high intensity lamps will probably change lens molds anyway to provide other marking and to secure improved beam pattern control.

Other proposed changes include substituting SAE J571d for J571c and J580b for J580a as two of the referenced standards on headlamps. SAE J571d incorporates Figure 2 of present Standard No. 108 which would be deleted from the body of the standard under the proposal. SAE J580b differed from J580a primarily by the addition of a definition for "aiming screws", changes of the aiming adjustment test procedure, and the requirement of aim retention with specified applied forces.

More than 380 comments on the proposal were received from manufacturers, State motor vehicles officials, and motorists. All comments have been considered. NHTSA has separated the comments into six major areas which will be discussed separately.

I. THE NEED FOR HIGH INTENSITY HEADLAMPS

The major issue which concerned the commenters was whether there is a need for headlighting systems capable of producing 150,000 candlepower, whether the sealed beam headlamp is the lamp best suited to provide high intensity lighting, and whether this high intensity lighting tends to produce an unacceptably high level of glare.

Motorists who commented to Docket No. 78-5 appear divided on the question of high intensity headlamps. There are those whose driving is largely urban in nature who argue that their present headlamps are adequate for their motor- ing needs. There are others in rural areas, who appear to use the upper beam more frequently than the average driver, and who want a brighter headlighting system for their vehicles. This division of opinion confirmed NHTSA's belief that allowance of higher intensity headlamps should be made on an optional basis and that the manufacture of present design headlamps should continue.

Statistics indicate that there is a significantly greater number of deaths and injuries that occur at night, and that cannot be totally attributed to alcohol or fatigue. A disproportionate number of these occur in rural areas where use of the upper beam is more likely to be required due to lack of ambient roadway light, and to occur in the absence of other vehicular traffic. While it

is not possible to determine how many of those casualties could have been prevented by better lighting, it is likely that the rate would have been reduced if the vehicles had been equipped with high intensity headlamps; NHTSA's research data indicates that the average night seeing distance for speeds of 50 mph and higher is less than the average braking distance and reaction time at that speed. NHTSA's review shows that a headlighting system using 150,000 candlepower increases nighttime seeing distance by over 20 percent where there are no cars approaching. In addition, research indicates that a sizeable number of pedestrian accidents occurring in rural and suburban areas could be reduced by improvements in roadway lighting; it is likely that better headlamps could provide some of these improvements.

Several commenters who are proponents of European unsealed lighting systems questioned whether the sealed beam system is the best medium for a high intensity headlamp, and suggested it would create an unacceptably high level of glare. All of NHTSA's extensive research on vehicle lighting has considered both disability glare, measured in possible loss of seeing distance, and discomfort glare, assessed by test subjects who were scientifically rated for visual acuity and glare tolerance. The subjects undertook on-road driving tests which evaluated their seeing distances while driving cars equipped with different headlighting systems, including the proposed high intensity systems.

The conclusion of the NHTSA research, supported by the findings of other expert researchers, is that the safety of night driving on the upper beam would be improved by the proposed level of intensity, with only minor degradation of seeing distance from misuse of that beam. Glare is a problem even at intensities below 75,000 candlepower. As headlight intensity increases to 150,000 candlepower there is an increase in disability glare, however it is less than proportionate to the increase in intensity. The 20 percent increase in seeing distance when no car is approaching contrasts favorably with the minor degradation in the worst case, when the upper beam is misused. In that case, when two vehicles utilizing 150,000 candlepower headlamps approach each other on the upper beam and both

fail to switch to lower beam, seeing distance is reduced only approximately 1.5 percent when compared to a corresponding situation involving vehicles utilizing 75,000 candlepower headlamps. This minor degradation from increased disability glare is transient. Furthermore, high intensity headlights are more readily noticeable and may improve the response of opposing drivers to signals to dim upper beam headlights. NHTSA also recognizes that the level of disability glare experienced when driving is considerably more sensitive to highway environmental factors than to headlight intensity.

In addition to its research, NHTSA has been sensitive to the views of those drivers who report that they are bothered by glare from headlamps of the levels of intensity now permitted. NHTSA has reviewed its own research and has uncovered no data indicating that disability glare (that glare which reduces seeing ability) from current headlamps creates a driving hazard to the average vehicle operator or to older drivers. Discomfort glare varies with drivers, however, and generally the eyes of older drivers are more sensitive to stronger lights whatever their sources.

II. HEADLAMP LENS MARKINGS

Notice 1 proposed that the lenses of the new high intensity headlamps be marked with an identification code and with the letters "DOT" constituting a certification that the lamps comply with applicable Federal motor vehicle safety standards.

As was to be expected, this aspect of the proposal was of little interest to the general public. Comments were received only from States, manufacturers, and one retailer. Industry did not express strong support for the proposed code, preferring instead to allow each manufacturer to retain its own system of trade numbers as a means of headlamp identification. Most requested that sufficient time be allowed to implement the new code if NHTSA decided to adopt it.

NHTSA has decided to adopt the code as proposed with an effective date of July 1, 1979. The lenses of headlamps have contained a lens code for several decades as a means of identification and the rule extends the practice in a logical

fashion. Trade numbers are not only more numerous than the code characters, but they are changed for specific technical design changes not necessarily related to interchangeability or performance of headlamps. Use of the NHTSA code will simplify lamp replacement for the consumer who will be able to identify a lamp by its universally applicable code number rather than by manufacturers' specific trade number. Since then lens code is visible with the lamp installed and the trade number is not, the code will give consumers and inspection stations a ready means of determining whether a balanced lighting system is installed on the vehicle. The proposal did not specify the minimum size of the characters, and the amendment will allow the manufacturer to choose the size and location on the lens most appropriate for his lamp design.

The great majority of comments opposed mandating use of the "DOT" symbol on the lens. Many felt that placing it above the lens marking code would interfere with beam refraction. Others commented on the cost that would be incurred in changing lens molds. Some suggested that the size and placement of the characters be the manufacturer's choice. Two commented that they felt the proposal was illegal under section 114 of the National Traffic and Motor Vehicle Safety Act which allows equipment items to be certified by a label or tag on the shipping containers as an alternate means to certification on the item itself.

The NHTSA has decided to adopt the proposed means of lens certification as mandatory for the new headlamps, effective July 1, 1979, with the size and placement of the "DOT" characters to be decided by the manufacturers. Thus, there need not be a problem of light interference and the lens mold may be changed at the same time for both the marking and certification code changes. The agency rejects the argument that it is illegal under section 114 to require items of equipment to bear certification markings. Such a requirement is well within the discretion accorded the Administrator under the act and general legal principle, and is consistent with the intent of the framers of the act. The NHTSA currently requires equipment items such as tires and brake hoses to bear the DOT symbol as mandatory certification.

III. HEADLAMP WATTAGE

Comments were made on the proposed headlamp wattages requesting increases, decreases, and minor changes. In the proposal the 2A1 headlamp was specified as 40 watts for upper beam and all comments on watts indicated that it should be a higher figure, generally 43 watts. The NHTSA agrees and accordingly has revised the 2A1 wattage to 43 watts.

The wattage for a system using 2A1 lamps would then be 6 watts or 3 percent higher than a system using 2C1 headlamps, whereas the two systems should be allowed the same level of performance. Since there should be no vehicle electrical problems associated with a 3-percent change in a headlamp intended for the after-market, the 2C1 headlamp is provided the same maximum of 43 watts on upper beam.

The proposed type 2D1 headlamp wattage of 70 watts for upper beam and 65 watts for lower beam exceeds present system wattages by 15 percent. This value would have provided the same wattage (and therefore performance) for all low beams of all systems and would have provided equivalent performance to the 2B1 headlamp system on upper beam. The comments and NHTSA information both indicate that an attempt to equate systems to this degree could possibly cause some electrical problems on older vehicles using the new lamps as replacement headlamps. Because of this concern of the after-market the NHTSA is reducing the wattage of the 2D1 headlamp to 65 watts for upper beam and 55 watts for lower beam.

Some comments recommended only a 1-watt change for some lamps. Such a minor change is insignificant to the effect of lighting performance on vehicle electrical systems and therefore the NHTSA has retained the same values as proposed.

IV. INCLUSION OF SAE J580b

The proposal to substitute SAE Standard J580b, *Sealed Beam Headlamp*, occasioned some comment. Among other things, J580b requires that headlamp aim be adjustable without removal of trim rings or other vehicle parts.

While it is believed that most of the industry currently conforms to this requirement, several

manufacturers commented that leadtime will be required to implement this change. The NHTSA has therefore decided to defer mandatory compliance with this portion of J580b until October 1, 1979.

V. MISCELLANEOUS CHANGES

In the proposed deletion of paragraph S4.1.134, the allowance of two Type 2B1 headlamps on motorcycles was inadvertently deleted and is hereby reinstated. Notice 1 also inadvertently omitted allowance of current low intensity headlamps on passenger cars and motor vehicles less than 80 inches in overall width. This was corrected by Notice 2 (43 FR 16783) and is retained in the amendment.

VI. OTHER ISSUES

A sizable number of comments from individuals and suppliers felt that there should be no amendment of existing headlamp requirements without consideration being given to unsealed headlighting systems that meet European standards.

In brief, these headlamps, popularly known as "quartz halogen", do not meet Standard No. 108's requirements for sealed beam construction, and mechanical aimability. Many unsealed systems also exceed the newly increased candlepower maximum of 150,000. These commenters frequently attacked the sealed beam concept as "outmoded" and "40 years behind the times", espouse the do-it-yourself philosophy of headlamp aim, and praise the "superior" lighting provided by their imported unsealed headlamps.

These issues are generally not within the scope of the rulemaking proposal under consideration, but have been considered, where appropriate, as supportive of a desire for better headlighting. It is felt that the sealed headlamps that will be shortly available by virtue of this rulemaking action, which NHTSA understands will utilize the halogen cycle, will provide the

brighter lighting that many people seek. The NHTSA has always expressed its willingness to consider alternate technologies supportable by objective data upon which safety performance standards can be based. In recognition of the public interest in the issue, NHTSA has placed relevant public correspondence and other materials in a general reading file "Halogen Headlamps" available for inspection in Room 5108 at 400 Seventh Street, SW., Washington, D.C.

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, is hereby amended . . .

In evaluating the cost impact of this rulemaking action, the NHTSA has concluded that there will be none with respect to headlamp manufacturers as the amendment provides an optional means of conformance to Standard No. 108. With respect to the requirement of J580b that headlamps be adjustable without removal of trim, it is believed that most manufacturers already comply. Those who do not may find it necessary to modify trim or sheetmetal or grille parts on a one-time basis but it is concluded that these modifications would be minor and that no significant costs would be incurred.

Because the amendment with respect to candlepower relieves a restriction it is made effective July 27, 1978.

The lawyer and program official principally responsible for this rule are Z. Taylor Vinson and Bill Eason, respectively.

(Secs. 103, 112, 114, 119, Pub. L. 89-563, 80 Stat. 718 (15 U.S.C. 1392, 1401, 1403, 1407); delegation of authority at 49 CFR 1.50.)

Issued on July 20, 1978.

Joan Claybrook
Administrator

43 F.R. 32416
July 27, 1978

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Motor Vehicle Lighting

(Docket No. 77-1; Notice 2)

This notice amends Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, to specify that rear side marker lamps on large trailers cannot be located higher than 60 inches above the road surface. This action was taken to achieve regulatory consistency with a parallel action of the Federal Highway Administration's Bureau of Motor Carrier Safety (BMCS) which has acted pursuant to a petition by the International Brotherhood of Teamsters, Chauffers, Warehousemen and Helpers of America ("Teamsters Union"). The effect of the limitation will be to make it more likely that the trailer rear side marker lamp can be viewed in the outside rear view mirror of the tractor pulling it, acting as a reference light by which the tractor driver may check the tracking of the trailer's rear end.

Effective date: March 1, 1979.

For further information contact:

Marx Elliott, Crash Avoidance Division,
Office of Vehicle Safety Standards, National
Highway Traffic Safety Administration, 400
Seventh Street, S.W., Washington, D.C.
20590, 202-426-1714.

Supplementary information: On January 17, 1977, NHTSA proposed (42 FR 3187) that rear side marker lamps on trailers with an overall width of 80 inches or more be located "as far to the rear as practicable and as close as practicable to the lower rear corner". The existing requirement is that they be "as far to the rear as practicable" and "not less than 15 inches" above the road surface. This action was taken as a parallel to rulemaking conducted by BMCS which had the following history. BMCS published an advance notice of intent to

amend 49 CFR 393.14 to require large semi-trailers and full trailers operating in interstate commerce to have the rear side marker lamps at or near the lower rear corner (40 FR 31959). The purpose of the proposal was to enhance traffic safety by providing a driver of a tractor pulling such a trailer with a reference light visible in the outside rearview mirror through which he may check the tracking of the trailer's rear end at night or at such other times as the headlamps are required. The NHTSA tentatively determined that a companion amendment of Standard No. 108 was required to preclude a conflict between the requirements of that standard and the BMCS Regulations.

BMCS, having evaluated the comments to the Advance Notice, proposed (41 FR 47948) that rear side marker lamps be "as near as practicable to the lower rear corner, and visible in the rearview mirror of the truck tractor when the trailer is tracking straight behind the tractor." The NHTSA proposal required only that the lamps be located as close as practicable to the lower rear corner. The difference in requirements was dictated by the different safety missions of the two issuing agencies—that of NHTSA, to insure that motor vehicles are manufactured in accordance with Federal motor vehicle safety standards, and that of BMCS, to insure that commercial vehicles in interstate commerce are operated in accordance with that agency's safety requirements. Federal motor vehicle safety standards do not apply to a combination of vehicles (tractor and trailer) and it would not be possible to determine at time of manufacture whether the rear side marker lamp of the trailer would be visible in the rearview mirror of every possible tractor that could tow it.

Fifteen comments were received on the proposal, 11 supporting the reasoning relative to the relocation of the side marker lamp. Six of these, however, recommended that the agency consider establishing a mounting height range due to peculiarities of certain trailer designs. For example, side marker lamps mounted at the lowest position on trailers designed to carry snowmobiles, motorcycles, or boats would be subject to water, dust, mud and road debris. The R. E. Dietz Company supported the concept of a tracking light but suggested that a special light be provided for that purpose. The proposal was objected to by, among others, the Truck Safety Equipment Institute (TSEI), because it would eliminate the present option of allowance of a combination clearance—side marker lamp, mounted higher than 60 inches and because low mounted side marker lamps would not necessarily be visible in tractor rear view mirrors. The Recreational Vehicle Industry Association joined TSEI in objecting on the ground that an option would be eliminated. It also cited potential problems with obscuration by mud or other road matter. Truck Trailer Manufacturers Association was not convinced that the location of the side marker lamp was such an important safety matter that it needed coverage by a Federal regulation. Concern was also expressed that the amendment would not achieve its purpose unless the marker lamps were required to project light toward the towing vehicle, and unless a candlepower output for that light was required.

NHTSA concurs with those commenters who expressed concern about low-mounted side marker lamps, and who suggested that a mounting height range from 15 to 60 inches would be preferable, and has decided to amend Standard No. 108 to reflect this comment. BMCS is joining NHTSA in a companion amendment pub-

lished today. Such a range will also afford a manufacturer more flexibility with respect to trailers of unique design, and should also come closer to the goal of providing visibility of a reference light in the mirrors of various sized towing vehicles. NHTSA realizes that the clearance—side marker lamp option will no longer be available for those trailers on which the clearance lamp is at a height greater than 60 inches, but has concluded that a height limitation must be adopted to insure a greater likelihood that the purpose of the rulemaking action is achieved. Adequate lead time is being afforded for design modifications. With respect to visibility of the side marker lamp by the driver, it is true that a lamp meeting Standard No. 108's minimum requirement that it be visible at a 45 degree angle from its mounting plane might not provide the reference light desired, but in common practice most of the rear side marker lamps appear to exceed this angle and should be visible in the rear view mirror. Further, NHTSA believes that the light output of current side marker lamps is sufficient to provide the desired cue.

In consideration of the foregoing Table II of 49 CFR 571.108 Motor Vehicle Safety Standard No. 108 is amended. . . .

The program official and lawyer responsible for the development this amendment are Marx Elliot and Taylor Vinson, respectively.

(Secs. 103, 119, Pub. L. 89-563, 80 Stat 718 (15 U.S.C. 1392, 1407); delegation of authority at 49 CFR 1.50).

Issued on August 25, 1978.

Joan Claybrook
Administrator

43 F.R. 38832-38833
August 31, 1978

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices and Associated Equipment

(Docket No. 78-08; Notice 2)

ACTION: Final rule.

SUMMARY: This notice amends Motor Vehicle Safety Standard No. 108 to increase the maximum permissible candlepower for single compartment tail lamps while extending requirements for contrast between stop (signaling) and tail (marking) functions at test points below the horizontal. This action is taken in response to a petition for rulemaking from industry. The effect of the increase will be to relieve a burden on manufacturers who must monitor production closely to insure continuing compliance of existing lamp designs with the existing limitation.

EFFECTIVE DATE: The amendment is effective immediately but compliance with the contrast requirements is not mandatory until July 1, 1980.

FOR FURTHER INFORMATION CONTACT:

Marx Elliott, Crash Avoidance Division, Office of Vehicle Safety Standards, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. (202-426-2720).

SUPPLEMENTARY INFORMATION: A limit of 15 candlepower on photometric output at test points on or above the horizontal is imposed on single compartment tail lamps by 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*. The intent of this limitation is to eliminate the possibility of excessive glare, and to insure that the ratio between stop lamps and tail lamp output offers sufficient contrast that the stop function can be readily identified when it is actuated.

On February 18, 1977, Truck Safety Equipment Institute (TSEI) petitioned for rulemaking to amend Standard No. 108 to increase the permissible

maximum output of single compartment tail lamps to 18 candlepower. This figure is derived from SAE Recommended Practice J256a Service Performance Requirements for Motor Vehicle Lighting Devices and Components, June 1972, which permits tail lamp output to be 120 percent of the maximum value specified in SAE Standard J585d, Tail Lamps (Rear Position Light) August 1970. The reason for TSEI's request is that the 15 candlepower limitation has become "an unnecessary burden on manufacturers who must attempt to monitor their productions in an attempt to insure a strict compliance with this maximum output". TSEI argued that an increase would have no detrimental effect upon safety because there has been no limitation on candlepower output below the horizontal and it was reasonable to assume that there must be countless driving situations every day "where the following driver is exposed to lamp candlepower outputs from approximately 15 cp to 22 cp" without any evidence of hazardous driving conditions because of glare. The basis of the petition, therefore, was that a restriction should be relaxed for economic reasons, and that the relaxation will have a neutral effect upon safety. The NHTSA granted TSEI's petition for rulemaking and proposed that the maximum output of single compartment tail lamps be raised to 18 candlepower, and that the current ratio of candlepower output by stop and tail lamps in combination lamps be maintained at test points above the horizontal and extended to test points below the horizontal to minimize problems of glare. NHTSA proposed the extension of the ratio to test points below the horizontal to provide protection equivalent to that at points above the horizontal. Standard No. 108 allows combination stop and tail lamps to be mounted as high as 72 inches above the road surface while in today's passenger cars the driver's eye point is much lower, only 38 inches to 48 inches above the road surface.

A notice of proposed rulemaking was published on this subject on May 4, 1978 (43 FR 19250), and an opportunity afforded for comment.

Twenty-seven comments were submitted on the proposal. There was one objection to the increase in candlepower, and two to extension of contrast ratios. All other comments supported it.

An important suggestion made was that NHTSA adopt SAE Standard J585e, September 1977 as the referenced standard on tail lamps since the SAE revision encompassed both of NHTSA's proposals. NHTSA concurred with this recommendation and is amending the standard in this fashion. J585e is otherwise identical to J585d except for the addition of a final sentence to Note 4 which prescribes an alternative way for computing the candlepower ratio for combination lamps when certain conditions are met.

The Japanese Automotive Manufacturers Ass'n. Inc. (JAMA), objected to the extension of the contrast ratio, principally because of its effect upon the motorcycle industry. In JAMA's opinion there is no need for the requirement to cover motorcycles as lamps are not mounted at a height greater than 38 inches. NHTSA does not concur with this comment. The amendment will insure that there is no confusion when the driver's eye reference point is lower than the average 38 to 48 inches above the road surface. This situation could occur when a motorcycle is on a hill in front of the driver of another vehicle. The mandatory compliance date of the requirement, July 1, 1980, should afford sufficient time for tooling of new lamps if needed.

Chrysler Corporation commented that it saw no need to adopt intensity ratio requirements for the test points below horizontal since photometric requirements for tail and stop lamps are the same, whether above or below horizontal. While the requirements are the same, the values prescribed are minimal and a manufacturer may establish its own values above the minimum level. NHTSA has concluded that the amendment would assure that the ratio now required above the horizontal would also be maintained below. It would also avoid use of the wrong replacement lamps or lens.

California Highway Patrol suggested that test point 5 D-V should be added to those at which not less than a 5 to 1 ratio is required. The NHTSA cannot add it at this time since it was not part of the rulemaking proposal, but consideration will be given to it in future rulemaking.

American Motors Corporation supported the proposal but commented that the 120 percent value specified in J256a should apply to all tail lamps and not just single compartment designs. This suggestion is beyond the scope of the proposal and NHTSA will consider it in future rulemaking.

Dry Launch suggested an increase from 15 to 20 and 25 candela. This suggestion was also considered beyond the scope of the proposal. Those values are permitted for two and three compartment lamps because the light sources are distributed, and NHTSA does not believe that excessive glare should be risked by increasing the maximum from 18 to 20 or 25 candela for single compartment lamps.

The proposal was objected to by G. F. Meese in whose opinion the upper limit should be 10 candela because excessive brightness irritates following drivers. The NHTSA did not agree with this comment. There appear to be instances in which the upper limit of 10 candela, which is being proposed by Mr. Meese, has been exceeded, and there is no indication that this causes any hazardous driving conditions because of glare.

In consideration of the foregoing 49 CFR 571.108, Motor Vehicle Safety Standard No. 108 is amended as follows:

1. Paragraph S4.1.1.28 is revised to read:

S4.1.1.28 Each tail lamp on any motor vehicle manufactured before June 1, 1980 may be designed to conform to SAE Standard J585d, Tail Lamps, August 1970.

2. Table I and Table III are amended so that the applicable SAE Standard for tail lamps in the final column of each Table is "J585e, September 1977."

In accordance with Department of Transportation policy encouraging adequate analysis of the cost and other consequences of regulatory actions (41 FR 16201, April 16, 1976), the NHTSA has evaluated the economic and other consequences of this amendment on the public and private sectors and has concluded that there is no cost increase required by an allowance of an increase in candle power in single compartment tail lamps. While there should be no increase associated with maintenance of contrast ratios at test points below the horizontal in combined lamp configurations, the NHTSA requested comments on this factor and received none.

The program official and lawyer responsible for the development of this proposal are Marx Elliott and Taylor Vinson, respectively.

Issued on December 13, 1979.

Joan Claybrook
Administrator

44 F.R. 75385
December 20, 1979

PREAMBLE TO AN AMENDMENT TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices and Associated Equipment

(Docket No. 69-19; Notice 18)

ACTION: Final rule.

SUMMARY: This notice finalizes the interim amendment of Motor Vehicle Safety Standard No. 108 adopted effective September 1, 1978, which retained the requirement that stop lamp lenses on motor driven cycles be a minimum of 3½ square inches.

EFFECTIVE DATE: The amendment is effective immediately.

FOR FURTHER INFORMATION CONTACT:

Marx Elliott, Crash Avoidance Division, Office of Vehicle Safety Standards, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. (202-426-2720).

SUPPLEMENTARY INFORMATION: On August 31, 1978, the agency published an interim rule and request for comments (43 FR 38831) deleting the requirement that low-speed motor driven cycles (mopeds) have larger stop lamps effective September 1, 1978, and asking whether the amendment should be made permanent. NHTSA noted it did not intend to include these vehicles in earlier amendments increasing the size of stop lamp lenses from a minimum of 3½ square inches to 8 square inches. The agency believed that moped

conspicuity and safety would be reduced if lamps on these low-powered vehicles were required to have a larger lens area without being required also to have higher light output. The effect of the interim amendment, therefore, was to retain the existing requirements.

Three comments were received in response to that Notice. Two supported the rule but the California Highway Patrol opposed it on the basis that moped rear lighting needs improvement. As noted above, simply reinstating the requirement for increased lens area would not improve safety. However, the agency intends to ask for comments in the near future on this aspect of moped safety.

In consideration of the foregoing, NHTSA hereby makes final the interim revision of paragraph S4.1.1.27 of 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, adopted on August 31, 1978.

The program official and lawyer responsible for the development of this rule are Marx Elliott and Taylor Vinson respectively.

Issued on February 19, 1980.

Joan Claybrook
Administrator

**45 F.R. 13736
March 3, 1980**

PREAMBLE TO AN AMENDMENT TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices and Associated Equipment

(Docket No. 77-1; Notice 4)

ACTION: Correction.

SUMMARY: This notice corrects a typographical error in the notice of correction published on December 28, 1978 (43 FR 60472). The error appears in the designation of the table, identifying it as "Table III" when the correct designation is "Table II". The effect was to change the heading of the last column in Table III from "Applicable SAE standard or recommended practice" to "Height above road surface measured from center of item on vehicle at curb weight". It is therefore necessary to correct the heading to Table III.

FOR FURTHER INFORMATION CONTACT:

W. Marx Elliott, Office of Rulemaking National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590. (202-426-2720).

Accordingly, Title 49, Code of Federal Regulations, § 571.108 is amended to read:

TABLE III.—*Required Motor Vehicle Lighting Equipment*

| Item | Applicable SAE standard or recommended practice |
|------|--|
| • | • |

The lawyer and program official principally responsible for this correction are Z. Taylor Vinson and W. Marx Elliott, respectively.

Issued on February 28, 1980.

Michael M. Finkelstein
Associate Administrator
for Rulemaking

45 F.R. 14577
March 6, 1980

| Test points (deg) | | Turn signal | Stop | Park- ing | Tail |
|-------------------|----------|----------------|------|--------------|------|
| | | | | | |
| 10U, 10D..... | 5L, 5R | 20 | 20 | 20 | 20 |
| | 20L, 20R | 12.5 | 12.5 | 10 | 15 |
| 5U, 5D..... | 10L, 10R | 37.5 | 37.5 | 20 | 40 |
| | V | 87.5 | 87.5 | 70 | 90 |
| H..... | 10L, 10R | 50 | 50 | 35 | 40 |
| | 5L, 5R | 100 | 100 | 90 | 100 |
| | V | 100 | 100 | 100 | 100 |

Figure 1a.—Required percentages of minimum candlepower of Figure 1b.

| Lamp | Lighted Sections | | |
|---|------------------|---------|----------|
| | 1 | 2 | 3 |
| Stop | 80/300 | 95/360 | 110/420 |
| Tail | 2/18 | 3.5/20 | 5.0/25 |
| Parking..... | 4.0 | | |
| Red turn signal..... | 80/300 | 95/360 | 110/420 |
| Yellow turn signal rear | 130/750 | 150/900 | 175/1050 |
| Yellow turn signal front..... | 200/ | 240/ | 275/ |
| Yellow turn signal front ¹ | 500/ | 600/ | 685/ |

Figure 1b.—Minimum and maximum allowable candlepower values.

¹ Values shall apply when the optical axis (filament center) of the front-turn signal is at a spacing less than 4 inches (10 centimeters) from the lighted edge of the headlamp unit providing the lower beam, or from the lighted edge of any additional lamp installed as original equipment or used in lieu of the lower beam.

| Group and test points | Turn signal | Stop | Park- ing | Tail |
|---|----------------|------|--------------|------|
| 1 10U-5L, 5U-20L, 5D-20L, 10D-5L..... | 65 | 65 | 60 | 70 |
| 2 5U-10L, H-10L, 5D-10L..... | 125 | 125 | 75 | 120 |
| 3 H-5L, 5U-V, H-V, 5D-V, H-5R..... | 475 | 475 | 420 | 480 |
| 4 5U-10R, H-10R, 5D-10R... | 125 | 125 | 75 | 120 |
| 5 10U-5R, 5U-20R, 5D- 20R, 10D-5R..... | 65 | 65 | 60 | 70 |

Figure 1c.—Sum of the percentages of grouped minimum candlepower.

5. Tables I and III, and the entry "Headlamps" in Tables II and IV are revised as follows:

TABLE I.—REQUIRED MOTOR VEHICLE LIGHTING EQUIPMENT

Multipurpose Passenger Vehicles, Trucks, Trailers, and Buses, of 80 or More Inches Overall Width

| Item | Multipurpose passenger vehicles, trucks, and buses | Trailers | Applicable SAE standard or recommended practice |
|--|--|---------------------|---|
| Headlamps..... | 2 white, 7-inch, Type 2 headlamp units; or 2 white, 5¾-inch, Type 1 head- lamp units and 2 white 5¾-inch, Type 2 headlamp units; or 2 white Type 2A headlamp units and 2 white Type 1A headlamp units. 2 white headlamps: Type 2B1 or Type 2D1; or 4 white headlamps: 2 each Type 1C1 and Type 2C1, or Type 1A1 and Type 2A1. | None..... | J580a, June 1966; J579a, August 1965; J571d June 1976; and J566, January 1960. J580b, February 1974; J579c, December 1974; J571d, June 1976; J1132, January 1976. |
| Taillamps ² | 2 red..... | 2 red..... | J585e, September 1977. |
| Stoplamps ² | 2 red..... | 2 red..... | J586c, August 1970 |
| License-plate lamp ¹ | 1 white..... | 1 white..... | J587, October 1981. |
| Reflex reflectors... | 4 red; 2 amber..... | 4 red; 2 amber..... | J594f, January 1977. |
| Side-marker lamps..... | 4 red; 2 amber..... | 2 red; 2 amber..... | J592e, July 1972. |
| Backup lamp ¹ | 1 white..... | None..... | J593c, February 1968. |
| Turn-signal lamp ² | 2 red or amber; 2 amber..... | 2 red or amber..... | J588e, September 1970. |
| Turn-signal operating unit ³ .. | 1..... | None..... | J589, April 1964. |
| Turn-signal flasher..... | 1..... | None..... | J590b, October 1965. |
| Vehicular-hazard warning-signal operating unit... | 1..... | None..... | J910, January 1966. |
| Vehicular-hazard warning-signal flasher..... | 1..... | None..... | J945, February 1966. |
| Identification lamps..... | 3 amber; 3 red..... | 3 red..... | J592e, July 1972. |
| Clearance lamps.. | 2 amber; 2 red..... | 2 amber; 2 red..... | J592e, July 1972. |
| Intermediate side marker lamps ⁴ .. | 2 amber..... | 2 amber..... | J592e, July 1972. |
| Intermediate side reflex reflectors ⁴ | 2 amber..... | 2 amber..... | J594f, January 1977. |

¹ See S4.1.1.10.

² See S4.1.1.11-12.

³ See S4.5.6.

⁴ See S4.1.1.3.

TABLE II.—LOCATION OF REQUIRED EQUIPMENT—MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 INCHES OR MORE OVERALL WIDTH

| Item | Multipurpose passenger vehicles, trucks, and buses | Trailers | Height above road surface measured from center of item on vehicle at curb weight |
|----------------|--|--------------------|--|
| Col. 1 | Col. 2 | Col. 3 | Col. 4 |
| Headlamps..... | On the front, each type at the same height, 1 on each side of the vertical centerline; as far apart as practicable. | Not required | Not less than 22 in (55.9 cm) nor more than 54 inches (137.2 cm). |
| . | . | . | . |

TABLE III.—REQUIRED MOTOR VEHICLE LIGHTING EQUIPMENT

All Passenger Cars and Motorcycles, and Multipurpose Passenger Vehicles, Trucks, and Buses, of Less Than 80 Inches Overall Width

| Item | Passenger cars, multipurpose passenger vehicles, trucks, and buses | Trailers | Motorcycles | Applicable SAE standard or recommended practice |
|--|--|----------------------|-------------------------------|--|
| Headlamps | 2 white, 7-inch, Type 2 headlamp units, or 2 white, 5¾-inch, Type 1 headlamp units or 2 white, 5¾-inch, Type 2A headlamp units and 2 white Type 1A headlamp units. 2 white headlamps: Type 2B1 or Type 2D1; or 4 white headlamps: 2 each Type 1C1 and Type 2C1, or Type 1A1 and Type 2A1. | | | J580a, June 1956; J579a, August 1965; J571d, June 1976; and J566, January 1960. J580b, February 1974; J579c, December 1974; J571d, June 1976; J1132, January 1976. |
| | | | 1 white | J584, April 1964; and J566, January 1960. |
| Taillamps ² | 2 red | 2 red | 1 red | J585e, September 1977. |
| Stoplamps ² | 2 red | 2 red | 1 red | J586c, August 1970. |
| High-mounted stoplamp | 1 red, for passenger cars only | Not required | Not required | J186a, September 1977. |
| License-plate lamp ¹ | 1 white | 1 white | 1 white | J587, October 1981. |
| Parking lamps ² | 2 amber or white | None | None | J222, December 1970. |
| Reflex reflectors | 4 red; 4 amber | 4 red; 2 amber | 3 red; 2 amber | J594f, January 1977. |
| Intermediate side reflex reflectors ⁵ | 2 amber | 2 amber | None | J594f, January 1977. |
| Intermediate side marker lamps ⁵ | 2 amber | 2 amber | None | J592e, July 1972. |
| Side marker lamps | 2 red; 2 amber | 2 red; 2 amber | None | J592e, July 1972. |
| Backup lamp | 1 white | None | None | J593c, February 1968. |
| Turn-signal lamps ³ | 2 red or amber; 2 amber | 2 red or amber | 2 amber; 2 red or amber | J588e, September 1970. |
| Turn-signal operating unit ^{3,4} | 1 | None | 1 | J589, April 1964. |
| Turn-signal flasher | 1 | None | 1 | J590b, October 1965. |
| Vehicular-hazard warning-signal operating unit | 1 | None | None | J910, January 1966. |
| Vehicular-hazard warning-signal flasher | 1 | None | None | J945, February 1966. |

¹ See S4.1.1.10.² See S4.1.1.11-12.³ See S4.5.6.⁴ See S4.1.1.5.⁵ See S4.1.1.3.

TABLE IV.—LOCATION OF REQUIRED EQUIPMENT ALL PASSENGER CARS AND MOTORCYCLES,AND MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES OF LESS THAN 80 INCHES OVERALL WIDTH

| Item | Passenger cars, multipurpose passenger vehicles, trucks, trailers, and buses | Motorcycles | Height above road surface measured from center of item on vehicle at curb weight |
|----------------|---|--|--|
| Col. 1 | Col. 2 | Col. 3 | Col. 4 |
| Headlamps..... | On the front, each type at the same height, 1 on each side of the vertical centerline; as far apart as practicable. | On the front, on the vertical centerline, except that if two are used they shall be symetrically disposed about the vertical centerline. | Not less than 22 in. (55.9 cm) nor more than 54 inches (137.2 cm). |
| . | . | . | . |

PREAMBLE TO AN AMENDMENT TO FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 108

**Federal Motor Vehicle Safety Standards;
Lamps, Reflective Devices, and Associated Equipment
[Docket No. 84-04; Notice 2]**

ACTION: Final rule.

SUMMARY: This notice amends Safety Standard No. 108 to allow motor vehicles to be equipped with a new four-lamp rectangular sealed beam headlamp system smaller than that currently allowed. A notice of proposed rulemaking ("NPRM") on This subject was published on April 30, 1984 (49 FR 18321).

The system, to be known as Type F, consists of two lamps which produce lower beam light and two lamps which produce upper beam light. The system will not utilize the supplementary upper beam from the lower beam headlamp as is the practice in current four-lamp systems.

Type F headlamps, though mechanically aimable, do not incorporate traditional lens-mounted aiming pads, and a special aimer adapter has been designed for the system. Because the aiming and seating planes are identical, the minimum amount of required horizontal aim is reduced from plus or minus 4 degrees to plus or minus 2 1/2 degrees.

The weight and volume of Type F headlamps are about half those of headlamps used in current four-lamp rectangular headlamp systems and the new system therefore offers the prospect of improved fuel economy through lighter vehicle weight and more aerodynamic front end design.

This notice completes initial rulemaking action implementing the agency's grant of petitions for rulemaking by General Motors Corporation, which developed the system, and American Motors Corporation. A second notice of proposed rulemaking on issues of simultaneous use of Type F headlamps, co-aiming and optional availability of an auxiliary filament will be published shortly.

EFFECTIVE DATE: July 1, 1985.

SUPPLEMENTARY INFORMATION: On April 30, 1984, NHTSA published a notice of proposed rulemaking implementing grants of petitions for rulemaking submitted by General Motors Corporation (GM) and American Motors Corporation (AMC) to amend Standard No. 108 to permit the use of new, smaller, rectangular sealed beam headlamps in a four-lamp system. GM, which developed the system, believes that it offers improvements in lower and upper beam photometric output, and improved aiming characteristics. Because of reduction in weight and volume, the system offers the potential for improved aerodynamics and enhancement of fuel economy. Comments were received from eight manufacturers of vehicles or lighting equipment, the Motor Vehicle Manufacturers Association (MVMA) and the California Highway Patrol (CHP).

Characteristics of the GM System

The new four-lamp rectangular sealed-beam system features headlamps with upper and lower beam performance which is different than that currently required. The supplementary upper beam traditionally found in four lamp systems is not necessary for the system to meet photometric requirements for the upper beam. NHTSA chose to designate the lamp as Type F with a prefix indicating its function, "UF" for the upper beam Type F, and "LF" for the lower beam Type F. Each Type F headlamp is of a size, 92 mm x 150 mm, such that its overall volume and weight are approximately half those of headlamps used in the current 4 1/2" x 6" four-lamp rectangular system (Types 1A1 and 2A1). Thus, there is an inherent

potential for more aerodynamic front ends featuring the new lighting system which, together with the lower weight of the system and its mounting hardware, offer the opportunity for improved fuel economy.

Upper Beam Performance

Auxiliary Filament

One feature of the original system that was requested by GM was an auxiliary filament in the lower beam lamp that would provide some light during upper beam operation.

The primary photometric contribution of this 35-watt, auxiliary filament would be to provide "incidental" light (5000 cd max, 1500 cd min) at the brightest light intensity test point (H-V). However, the upper beam lamp alone could meet the requirement at this test point as well as all other test points.

GM said that there were four other possible reasons for an auxiliary upper beam filament to be located in the lower beam lamp:

1. To serve as a heating element to prevent ice from forming on the lower beam lamp during upper beam use.
2. To mark the outside, leading edges of the vehicle during upper beam use.
3. To be used as a daytime front running lamp.
4. To prevent the owner from perceiving that there is less available light during upper beam use.

GM did not believe that the auxiliary filament was necessary for upper beam enhancement, heating purposes, or edge delineation, but it could be offered as a driver option to allow consumers to have a choice between more light or better fuel economy during upper beam use or, alternatively, to be used as a daytime running light. GM's wish to offer the auxiliary filament as a driver option was not accepted by NHTSA in the NPRM because no requirements were recommended, and NHTSA did not desire to propose additional requirements for switching and "tell-tales" that advise the driver about what headlamp elements would be in operation. Without proper advisories and switching safeguards, driver confusion and misuse could result.

Since the upper beam lamps alone could meet current upper beam photometric requirements NHTSA proposed use of upper beam lamps alone as one option during upper beam operation. NHTSA also proposed the option of using the

lower beam lamp along with the upper beam lamp during upper beam selection. Since the 35-watt, auxiliary filament in the lower beam lamp provided only incidental light with low light-energy efficiency, the agency rejected use of this filament during ordinary upper or lower beam operation. However, the auxiliary filament could conceivably serve as a daytime running light, a concept under consideration in Canada, and the NPRM proposed that an auxiliary filament could be incorporated and used for that purpose.

In an initial response to the NPRM, GM stated that there were several good reasons for eliminating the auxiliary filament in the lower beam lamp. First, the NPRM proposed that this filament would be permitted to be used only as a daytime running lamp, and GM had found alternative methods of producing such a light at lower operating wattages. Eliminating the auxiliary filament would eliminate filament shadow and improve lamp reliability and durability. Therefore, on May 11, 1984, GM directed a letter to NHTSA and 41 other headlamp manufacturers, users, and researchers noting that GM intended to recommend eliminating the auxiliary filament and inviting comment on that recommendation.

On May 30, 1984, GM recommended deletion of the auxiliary filament instead of allowing it as an option as the NPRM had proposed. GM pointed out that this would eliminate the need to develop and provide two versions of the lower beam headlamp—one with and one without the auxiliary filament. GM noted that the proposed upper beam headlamp could be used as a daytime running light by electronically reducing the power consumption to 16 watts per upper beam lamp, which would provide a better lamp for that purpose since it would provide more efficient light with appropriate beam pattern, rather than "extraneous" or "incidental" auxiliary beam light. Other claimed advantages for eliminating the auxiliary beam were savings due to fewer connections and leakage paths in the lower beam lamp, a smaller-diameter bulb tube that might allow longer lamp life, lower piece cost, and less capital investment.

Seven other commenters recommended deletion of the auxiliary filament (Lucas Industries, VW, GE, Ford, AMC, CHP, and MVMA with the exception of Chrysler), citing advantages similar to those stated by GM and noting no disadvantages. The CHP stated they were not "overwhelmed by the ethereal reasons for lighting all four lamps"

that were given by car manufacturers at the time these lamps were introduced, and therefore had no objection to deleting the auxiliary filament. Chrysler requested an opportunity to incorporate an auxiliary filament in the headlamp system so that such a filament could be used as a potential daytime running light in Canada. Chrysler's analysis indicated that incorporating the auxiliary filament might be significantly more cost efficient than adding supplemental lamps.

Sylvania believed that from a safety standpoint, it may be unwise not to emit light from the lower beam headlamp during upper beam selection because this lamp is installed at the outside edges of vehicles and serves as an indicator of car position for on-coming drivers. Because of these factors, Sylvania believed that elimination or the optional use of this capability to illuminate the lower beam lamp be given careful thought.

NHTSA considered all the above comments, and has decided not to incorporate the proposed auxiliary filament in the lower beam lamp since its removal offers overall better headlamp performance, and viable alternatives appear to exist for daytime running lights. Sylvania's recommendation to use the proposed auxiliary filament for edge delineation was considered along with other comments regarding the optional use of either the upper beam lamp alone or both the upper beam lamp and main lower beam filament during upper beam selection. NHTSA believes that there are no other safety reasons for mandating the use of the outer lamp as discussed below:

- As designed by GM the new system does not need the illumination assistance of the "extra" filaments, requiring only the single upper beam filaments to perform as well as many other lamps currently available.
- When four headlamp systems were first introduced, front parking lamps were not required to be illuminated when the headlamps were on. At that time, it probably seemed reasonable that the illuminated outboard lower beam headlamps marked the edge of the vehicle. Parking lamps are now required to be on and help perform this edge marking function.
- Additionally, when the upper beams are on, it is unlikely that side markers lamps and possibly the parking lamps would be seen, because of positional and contrast problems. Thus the

relationship of the vehicle width and the in-board headlamp location would still be unknown to the oncoming driver. But it is also unlikely that upper beams would be on when oncoming drivers are close enough to need to know where the front corner of the opposing vehicle is.

- Another reason suggested in the comments for illumination of the lower beam lamp is to provide heat to prevent ice from forming on the lower beam lens while using the upper beam. While this may have been the argument for lighting the low beam when four-lamp systems were initially developed in the 1950's, the agency knows of no data which support the need to provide, by regulation, a solution to a problem of ice forming on a lens that is temporarily not in use.
- Thus, while there may be historical precedence for having the outer lower beam headlamp illuminated during upper beam use, there appears to be no valid safety-oriented basis to require it.

For the reasons discussed above, NHTSA has determined that an auxiliary filament is not needed in the Type LF lamp and therefore that feature of the April 30, 1984, NPRM has not been adopted. However, in light of the interest shown by at least one manufacturer (Chrysler) in incorporating such a filament on an optional basis, the agency will seek, in a notice to be issued shortly, additional comments as to whether to permit the inclusion of an auxiliary filament.

Simultaneous Use

More efficient and potentially effective light for upper beam enhancement seemed available from the main lower beam filament in the lower beam lamp. Instead of providing light to the right and above the road as the auxiliary beam would, the lower beam would provide significant additional light on the road, and add significant spread light to further illuminate the roadway shoulders. Using this filament during upper beam selection would also eliminate any potential concern about ice formation, edge delineation, or less available light. Preliminary GM test data were examined to evaluate potential upper beam photometric compliance problems in using this approach. NHTSA concluded that the probability of exceeding the two current maximum values, 75,000 cd. and 7,500

cds, respectively, for the brightest light intensity test point (H-V) and the foreground light test point (4D-V) was very low. Both the lower beam and the upper beam are limited in total output at or near the point of highest intensity (H-V), production practices tend to limit the number of very high output lamps, and the likelihood of four very high output lamps being placed on the same vehicle was considered to be very low. Therefore, NHTSA proposed that manufacturers have a second option of using both the main lower beam filament and the upper beam lamp during upper beam operation and requested comment on the feasibility of this approach.

Data submitted by GM on pre-production lamps have shown, contrary to NHTSA's belief, that some photometric maxima values may be exceeded during the simultaneous use of the upper and lower beams. The CHP also expressed its concern over the potential for this. Therefore, NHTSA has decided to reconsider this proposal in a separate notice of proposed rulemaking.

Photometric Performance

In the April 30, 1984, Notice of Proposed Rulemaking, it was proposed that the upper beam light of the Type F system would be produced by only one of the two lamps on each side of the vehicle. This is in contrast to all existing four-lamp systems, which use both lamps to produce the upper beam. It was also proposed that the manufacturer have the option of wiring a vehicle in such a way that the lower beam lamps would operate during upper beam operation. These two features of the Type F system led to a proposed set of photometric criteria for the UF lamp that are different than the upper beam criteria for other four-lamp systems. The CHP noted that this change would provide a "worthwhile" increase in required lamp output, since it was above the lowest-performing, current production designs. Based on the response to the proposed upper beam photometric values, and since they provide a level of safety equivalent to that already provided by Standard 108, NHTSA is amending Standard No. 108 to incorporate these values.

Lower Beam Performance

At present, the lower beam lamp in a four-lamp system provides some of the upper beam light—it has a second filament to do this. Also, the lens

prescription of the current lower beam lamp is designed for this dual function. In the system requested by GM, the lower beam lamp produces only lower beam light and thus its lens prescription can be optimized for the low beam function. GM claimed that the benefit of using this design approach would be that the lower beam lamp could be designed for optimum performance and increased seeing light.

Except for 1 of 13 test point values, GM's final recommended lower beam photometrics were within the currently required test point value ranges. The one exception was an increase to a maximum value at a test point ($1\frac{1}{2}$ D- $1\frac{1}{2}$ L to L) that was located near the glare zone. GM wanted to increase this value from 2,500 cd to 3,000 cd to reduce the sensitivity of the lamp to horizontal misaim and to permit more uniform left lane lighting. In conjunction with this increase, GM recommended increases in the minimum values at the seeing light test point and at spread light points.

The California Highway Patrol (CHP) believed the proposed changes would be the first concrete step taken to improve the Federal lower beam requirement, citing the increase in minimum test point values by 20% to 33% in four areas of the lower beam with no further increase in maximum glare values above the horizontal. Ford recommended that the Type F system should be approved but disagreed with all new proposed photometric values and with NHTSA's tentative position that the proposed values represented an improvement in lighting. Ford pointed out that its CHES computer headlamp evaluation model was gaining wide respect as an appropriate and objective tool for testing lighting performance, and commented that the proposed lower beam lamp "did not show any significant improvement in overall headlamp performance" when it was evaluated by the CHES model.

Sylvania stated that the proposal offered improvements in photometrics, noting "it is desirable to improve the performance of headlamp systems whenever they are considered. It should be the policy of NHTSA and the lighting industry to insure that any item or device that is considered, both now and in the future, be equivalent or better than existing lighting systems." Sylvania believed the increased spread light requirements of the proposed lamp system were justified and it urged adoption of these requirements.'

General Electric (GE) endorsed the improved photometrics but also desired an increase in the 10U-90U glare value from 125 cd maximum to 175 cd maximum. The purpose for this glare increase would be to allow for random spots of higher intensity light that can occur from stray reflections of light inherent in halogen bulbs. NHTSA believes this increase is not the best solution because lamp designers would then be designing for a higher level of 175 cd, and increase the potential for unsafe veiling glare that would result during inclement weather.

AMC fully supported the photometric changes sought by GM and proposed in the NPRM. GM noted that it designed the proposed system for its customers, but felt that no justification had been shown that this level of performance should be required of all new headlamp systems.

The one suggested increase in a maximum test point value ($\frac{1}{2}$ D-1 $\frac{1}{2}$ L to L) was initially of some concern to NHTSA because that test point location is close to the glare zone. Increases in this test point value could result in higher glare intensity levels if the headlamps were aimed too high, but it would also permit more uniform lighting ahead of the vehicle. A recent NHTSA study¹ recognized this potential problem, but the study also found that drivers can accept higher glare levels without discomfort. A 100% increase in this test point value was thought to be reasonable based on the study data, while GM recommended only a 20% increase.

The CHP and Ford also expressed some concern about increasing this test point value. The CHP noted that the 20% increase should allow better seeing ability, but it does not alleviate the complaints of compact-car drivers about the excessive brightness of high-mounted headlamps on taller four-wheel-drive pickups. Ford noted that photometric values are more sensitive to the vertical aim of the headlamp and an increase in the general intensity of a beam in these areas makes the lamp more susceptible to causing glare. The MVMA stated that there was no reason to expect this headlamp system to exhibit any new performance characteristic that would cause a level of glare significantly different from the glare produced by

currently permitted headlamps. However, the MVMA believed that more research was needed to address the subject of discomfort glare from headlamps. GE supported this value, and no other commenters directly addressed this subject.

After considering these comments, NHTSA has concluded that the 20% increase in this test point value is well within the 100% increase thought to be reasonable by the most current research on the subject, and that adopting this value should not pose any safety problem.

In its petition, GM had also added a new test point value (1D-V) that it claimed was necessary to prevent the lower beam from being aimed too far to the right. GE, the only commenter on this subject, believed this new test point was design-restrictive and redundant, noting that the test point $\frac{1}{2}$ D-1 $\frac{1}{2}$ R controls excessive aim to the right. NHTSA believes that beam patterns which meet this specification at 1D-V have the potential for placing more light down the road, as the petitioner claimed. However, NHTSA accepts the GE position that the specification for this point may be redundant with the specification at $\frac{1}{2}$ D-1 $\frac{1}{2}$ L to R. Therefore, this specification is not adopted as part of Figure 15.

In summary, on the basis of the proposal and the comments, NHTSA continues to believe that the level of safety inherent in the proposed photometric test points is equivalent to the level provided by existing lamp systems and that the proposed photometrics are appropriate for lamp systems of this design. Additionally, NHTSA will apply these photometrics to future lamp systems of similar design, where one optical system is dedicated to lower beam use and another optical system is dedicated to upper beam use. Such systems would include those with either four lamps or four light sources.

The proposed photometric values seemed to represent an improvement in lower beam photometrics because more light would be provided in roadway locations where pedestrians and other objects must be seen and avoided. Therefore the NPRM asked whether these photometrics should be required for all headlamp systems. All commenters who addressed this question felt that it was inappropriate at that time to apply these photometric criteria to all existing systems. In the absence of significant, quantitative evidence on the safety effects of these values, the agency is not adopting their use on all headlamp systems.

¹"Improved Low Beam Photometrics," Olson and Sivak, University of Michigan Transportation Research Institute; Interim Report No. UM-HSRI-81-4, February, 1981; Final Report No. UMTRI-83-9, March, 1983.

Additionally, NHTSA agrees with the suggestion from Ford and MVMA that some type of objective evaluation tool is needed for identifying safety improvements in roadway illumination performance. A program for development of such a tool will be initiated in the near future. This program will build on the extensive research base that already exists as well as the computer techniques that have been developed by Ford, MVMA and others.

Luminance

According to GM, the proposed lamp has a lens light-emitting area of 9,271 square mm, and the current small rectangular headlamp has a lens light-emitting area of 14,014. Therefore, the proposed lamp is about 1/3 smaller in lens light-emitting area than the current small rectangular headlamp. Since both of these lamps have similar glare point intensity limits, the proposed lamp would have a higher luminance value. (Luminance is the ratio of light intensity to the light-emitting area.) Generally, there is a potential for an increase in glare when a lamp of given intensity is reduced in lens area and, therefore, is increased in luminance. To date, there is no known recognized method to objectively compare the influence of headlamp luminance values to the potential for discomforting glare. GM stated that its subjective tests did not indicate a glare problem, and NHTSA tentatively accepted this finding. However, comment on this issue was requested in the NPRM.

Four commenters did not directly address this issue (Lucas, VW, GE, and AMC); Chrysler stated that it did not have sufficient experience with the proposed system to make any recommendations; five commenters (GM, Ford, Sylvania, MVMA, and the CHP) believed there would be no safety problem. GM noted that test results to date indicate "substantially less" light-intensity levels in the glare zone for the proposed headlamps as compared to current large rectangular headlamps (142 mm × 200 mm). As a result, GM believed these lower light-intensity levels "should more than make up for any brightness differences which may be attributed to size differences." GM also noted that for a comparable amount of seeing light, the proposed system will have a substantially lower intensity of glare light than any other headlamp size. Subjectively, GM believes that increased seeing light is the more important factor, and does not find the brightness to be objectionable.

Ford noted that the brightness distribution over the lens area of headlamps generally is not uniform—the size, shape and brightness gradients all are contributing factors. Ford surmised that although the proposed lamp is smaller, it will not exhibit any difference in glare from other headlamps of slightly greater size. Sylvania believed the design geometry of the lamp, along with the photometric requirements, would prevent the luminance factor from being a problem. The CHP and MVMA did not expect any discomfort glare effects. Since there was no objection from commenters and no additional information is available, NHTSA has concluded that luminance will likely not be a problem with the Type F headlamp system.

Improved Aiming Features

Current sealed-beam headlamps are positioned or seated in their mountings through the use of lugs located on the back of the reflector, which form a seating plane, but they are aimed through the use of aiming pads located on the lens face, which form an aiming plane. GM claimed that the proposed new headlamp would have more accurate aiming features than current sealed-beam headlamps because it would be designed to have the seating plane and the aiming plane coincide. Pads on the front of the lens-to-reflector flange would be used as a common plane to seat the lamp in its mounting and to aim the lamp.

A NHTSA evaluation of the dimensional tolerances that are allowed for current headlamp units indicated that the skew error in angular alignment between the seating and aiming planes can be as large as $\pm 2.9^\circ$. Since the seating plane and aiming plane would be constructed to coincide in the proposed GM lamp system, this skew error would be eliminated. As a result, if a properly aimed headlamp is replaced, the replacement headlamp should remain properly aimed. Since replacement of headlamps without re-aiming has become a frequent practice, this new design should result in greater numbers of properly aimed replacement headlamps. The agency believes that proper aim reduces glare to oncoming drivers and improves seeing distance for both drivers. Eliminating the skew error would also reduce the amount of mechanical aim adjustment that must be provided to aim the lamp. Therefore, NHTSA proposed to reduce the minimum amount of required horizontal aim adjustment from $\pm 4^\circ$ to $\pm 2\frac{1}{2}^\circ$.

And, since this approach has the potential to improve aim retention and reduce mechanical aim adjustment requirements on future headlamps, NHTSA asked whether common seating/aiming planes should be required on future headlamps.

Four commenters did not directly address this proposed common seating/aiming plane requirement (Lucas, Ford, GE, and AMC). Chrysler stated that it did not have any experience with the proposed headlamp system and could not make any recommendations, but it believed that the inclusion of design-oriented requirements inhibits design freedom and innovation. Five commenters (GM, Sylvania, VW, MVMA, and the CHP) generally agreed that the design seemed achievable and had merit. While GM and MVMA agreed that the requirements seemed appropriate for the Type F lamp system, they did not support such a requirement for other headlamp systems, noting this requirement would not necessarily be practical for replaceable bulb headlamps and could stifle future innovation.

The CHP argued this aspect should be clearly stated in the standard as a direct requirement rather than its intent being inferred by the proposed figures. NHTSA believes that the proposed rule is quite specific about requiring the lamps to be designed to meet the requirements of the new proposed figures and, therefore, does not believe further statements are necessary. Since all comments favored applying this requirement to only the proposed lamp system, and not to all future headlamp systems, NHTSA has adopted this aspect of the proposal for only the Type F system and will not consider it for all future headlamp systems.

Regarding the proposed reduction in horizontal aim adjustment, three commenters did not directly address this issue (Lucas, GE, and AMC), while six commenters (GM, Sylvania, Chrysler, VW, Ford, and the MVMA) supported the reduction and the CHP opposed it. Sylvania believed that the current horizontal and vertical aim adjustments of $\pm 4^\circ$ were more than was necessary for any headlamp system. Chrysler submitted that current horizontal aim adjustment requirements were excessive and could be reduced for all headlamp systems. The CHP agreed that the common aiming/seating plane would eliminate the described skew error, but it also found that during its random inspection of vehicles, a number of headlamps were misaimed "considerably beyond" the 1.9° range of aim measuring equipment. Therefore,

reducing the minimum adjustment range to $\pm 2.5^\circ$ did not seem to leave much room for all the possible sources of misaim due to lamp and mounting hardware tolerances.

The report "Analysis of Sources of Error in Headlamp Aim"² indicates that when aiming/seating plane skew errors are eliminated, the range needed to compensate for other sources of error is about $\pm 0.115^\circ$ when mechanically aiming and about $\pm 0.988^\circ$ when optically aiming. An adjustment range of $\pm 2.5^\circ$ appears adequate to compensate for errors. The standard is therefore amended to reduce horizontal aim adjustment for headlamps with a common aiming/seating plane.

GM had petitioned for, and NHTSA subsequently proposed, a method to simultaneously aim both the lower and upper beam lamps. Both lamps would be mounted in a common housing and would have a common aim adjustment. Comments from the CHP and GE noted that applying requirements to the entire headlamp assembly was not normal industry practice. The CHP also pointed out that on the requirements for aim tolerances, it is necessary to specify what portion of the $\pm 1/4^\circ$ reaim would be applied to the lamps and what portion would be applied to the mounting assembly. CHP's suggestion about the further need for specifying such tolerances may have merit, but such changes cannot be accomplished unless the public is allowed to comment. Therefore, this proposal for simultaneous aim will be reconsidered and addressed in the separate notice of proposed rulemaking.

Headlamp Aimer Adapter

The current standard requires that all headlamps must be mechanically aimable. In order to meet these requirements, GM proposed an adapter for current mechanical aiming equipment that seemed to offer an acceptable means of mechanical aim. To provide sufficient lead time for inspection stations and repair facilities to obtain the adapters, NHTSA proposed that these adapters be provided with each vehicle that is manufactured with the proposed headlamps up to July 1, 1986.

No comments were received about the type of adapter proposed, and only GM and AMC commented on the requirement to equip vehicles with

²"Analysis of Sources of Error in Headlamp Aim," Olson and Mortimer, University of Michigan Transportation Research Institute, March 1974.

these adapters. Both GM and AMC project that use of the proposed lamps will be "very substantial," with GM tentatively planning to market over a half-million vehicles with the proposed headlamp system prior to July 1, 1986. GM estimated it would be issuing almost 10 times the number of adapters that are needed in the field if it must meet the proposed requirement. Therefore, as an alternative to meeting this requirement, GM proposed to assure that an ample supply of adapters would be available for sale in more than adequate time to meet any field needs. GM noted that its good faith has already been demonstrated, since it has already purchased the adapter tooling and it will not realize any profit. AMC believes that there will be sufficient motivation to supply these adapters, and with the normal industry pre-model process and practice of keeping up with new technology, there should be no problem in incorporating the use of these adapters. Therefore, both GM and AMC recommended against adoption of this aspect of the proposal. NHTSA has concurred in those comments.

Three principal aspects of the April proposal have been determined to merit further consideration. The first of these was the optional use of the lower beam during the use of the upper beam. The second was the co-aimability of the upper and lower beam Type F lamps. The last is the optional use of the auxiliary filament. The agency has decided to re-propose these features of a Type F system in a separate notice. That notice will provide an analysis of the comments on these issues from the April 1984 NPRM as well as the reasons behind the new proposal. It is anticipated that the proposed changes to the rule being adopted today will have an effective date of July 1, 1985.

NHTSA has considered this rule and has determined that it is not major within the meaning of Executive Order 12291 "Federal Regulation" or significant under Department of Transportation regulatory policies and procedures, and that neither a regulatory impact analysis nor a full regulatory evaluation is required. However, a regulatory evaluation has been prepared and placed in the public docket. Since use of Type F headlamps is optional, the rule will impose no additional requirements but will permit manufacturers greater flexibility in the use of headlighting systems.

NHTSA has analyzed this rule for the purposes of the National Environmental Policy Act. The

rule may have a small positive effect on the human environment, since the weight and quantity of materials used in the manufacture of headlamps will be reduced.

The agency has also considered the impacts of this rule in relation to the Regulatory Flexibility Act. I certify that this rule would not have a significant economic impact on a substantial number of small entities. Accordingly, no regulatory flexibility analysis has been prepared. Manufacturers of motor vehicles and headlamps, those affected by the rule, are generally not small businesses within the meaning of the Regulatory Flexibility Act. Finally, small organizations and governmental jurisdictions will not be significantly affected, since the price of new vehicles, headlamps, and aimers adjusters will be minimally impacted.

In consideration of the foregoing, 49 CFR 571.108, Motor Vehicle Safety Standard No. 108, *Lamps, Reflective Devices, and Associated Equipment*, is amended as follows:

1. Paragraph S4.1.1.34 is revised by adding the following at the end of the chart:

| System | Headlamp Type | Number of Headlamps |
|--------|-------------------|---------------------|
| | * * * * * | |
| 6 | Type UF | 1 |
| | and | |
| | Type LF | 1 |

2. New sections S4.1.1.43, S4.1.1.44, and S4.1.1.45 are added to read:

* * * * *

S4.1.1.43 Instead of being equipped with a headlighting system specified in Table I or Table III, a passenger car, multipurpose passenger vehicle, truck or bus manufactured on or after July 1, 1985, may be equipped with a headlighting system of two Type UF and two Type LF headlamps designed to conform to:

(a) The dimensions specified in Figures 11, 12, 13, and 14.

(b) The photometric requirements of Figure 15.

(c) The requirements of SAE Standard J579c *Sealed Beam Headlamp Units for Motor Vehicles*, December 1978, with the following exceptions:

(1) The definitions in sections 2.4 through 2.11 do not apply.

(2) In Section 2.12, the definition of "Mechanically Aimable Sealed Beam Unit" is: "A unit having three pads, defining a mechanical aiming plane, used to adjust and inspect the aim of the unit when installed on the vehicle."

(3) In Section 2.13, the definition of "Aiming Plane" is: "A plane defined by the three aiming pads."

(4) Section 3.4 does not apply.

(5) Tables 1 and 2, and Figures 1 and 2 do not apply.

(6) In Section 3.5.1 and 3.5.3, references to "Tables 1 and 2" and Figure 3 are replaced by "Figure 15."

(7) Section 3.6 does not apply.

(d) When tested in accordance with Section 3.5.2 of SAE Standard J579c *Sealed Beam Headlamp Units for Motor Vehicles*, December 1978, the mounted assembly (either Type UF or Type LF headlamps, respective mounting ring, aiming ring, and aim adjustment mechanism) shall be designed to conform to meet the requirements of Figure 15 for upper or lower beams respectively without reaim when any conforming Type UF or LF headlamp is tested and replaced by another conforming headlamp of similar type.

(e) The requirements of SAE Standard J580, August 1979 *Sealed Beam Headlamp Assembly*, with the following exceptions:

(1) Section 2.2 Mounting Ring reads: "the adjustable ring upon which the sealed beam unit is mounted and which forces the sealed beam unit to seat against the aiming ring when assembled into a sealed beam headlamp assembly."

(2) The definition "2.3 Aiming Ring" reads: "The clamping ring that retains the sealed beam unit against the mounting ring, and that provides an interface between the unit's aiming/seating pads and the headlamp aimer adapter (locating plate)."

(3) In Section 3, the correct version of SAE J575 is "SAE 575f (April 1975)."

(4) Section 4 does not apply.

(5) Section 5.1 reads: "Headlamps shall be designed so that they may be inspected and aimed by mechanical aimers as specified in SAE J602 October 1980, without the removal of any ornamental trim rings or other parts."

(6) Section 6.1.1 reads: "When the headlamp assembly is tested in the laboratory, a minimum aiming adjustment of ± 2.5 deg. shall be provided in the horizontal plane and ± 4 deg. in the vertical plane."

(7) Section 6.1.2 reads: "...through an angle of ± 2.5 deg. and ± 4 deg., respectively."

(8) Section 6.3 is retitled "Retaining Ring/Aiming Ring Tests."

(9) In Section 6.3.2 add the flange thickness "92 x 150 mm.....0.340 in. 8.6 mm)"

(10) Figures 2, 3, and 4 do not apply, and the reference to them in Section 6.5 is replaced by "Figure 16, Deflectometer, of Federal Motor Vehicle Safety Standard No. 108."

S4.1.1.44 The lens of each headlamp designed to conform to paragraph S4.1.1.43 shall be marked with:

(a) The designation "F" if it provides an upper beam, or "LF" if it provides a lower beam; and

(b) The symbol "DOT" (either horizontally or vertically) which shall constitute a certification that the headlamp conforms to all applicable Federal motor vehicle safety standards.

S4.1.1.45 Each headlamp designed to conform to paragraph S4.1.1.43 shall also be designed to conform to the following specifications:

| | Type LF | Type UF |
|--|--------------|-------------|
| Watts @ 12.8 V (design voltage)..... | 60 max..... | 70 max..... |
| Average Life @ 14.0 V (rated voltage)..... | 320 hr. | 150 hr..... |

3. New Figures 11, 12, 13, 14, 15, and 16 are added as follows:

Issued on December 20, 1984.

Diane K. Steed
Administrator

49 FR 50176
December 27, 1984

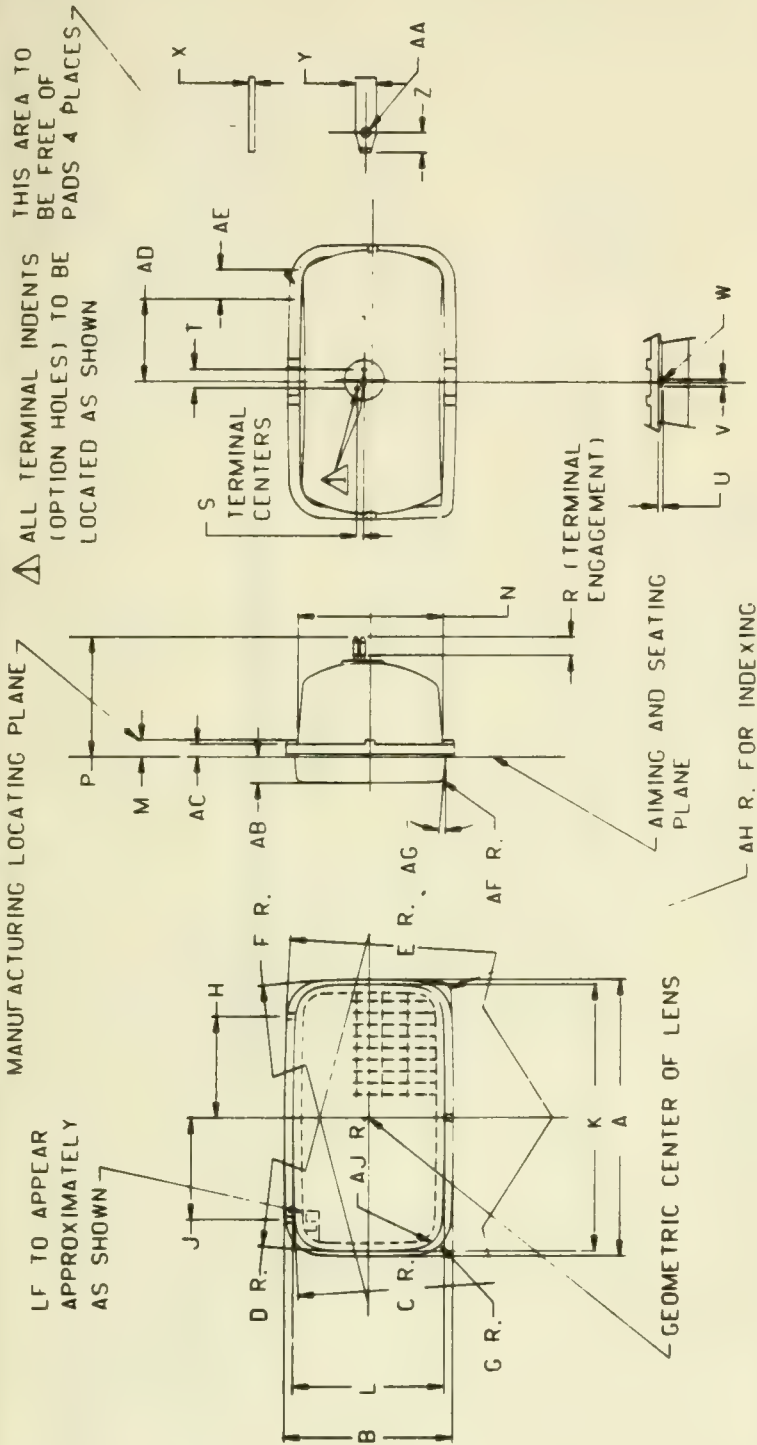
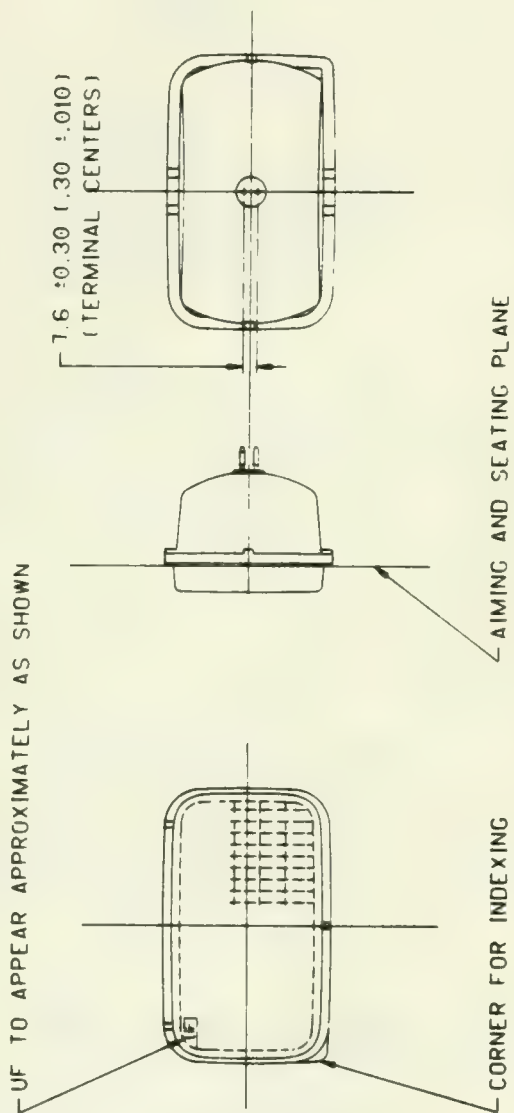


FIG. 11 -

TYPE LF

RECTANGULAR
SEALED BEAM
HEADLAMP UNIT

| LETTER | INCH | MM | LETTER | INCH | MM |
|--------|--------------|----------------|--------|------------------|------------------|
| A | 5.93 ± .050 | 150.50 ± 1.20 | R | .41 MIN. | 10.5 MIN. |
| B | 3.64 ± .050 | 92.50 ± 1.20 | S | .15 ± .010 | 3.8 ± 0.30 |
| C | 63.0 ± 3.94 | 1600.0 ± 100.0 | T | .41 ± .010 | 10.43 ± 0.30 |
| D | 23.6 ± 1.91 | 600.0 ± 50.0 | U | .024 MIN. | 0.60 MIN. |
| E | 63.0 ± 3.94 | 1600.0 ± 100.0 | V | .315 MAX. | 8.0 MAX. |
| F | 23.8 ± 1.91 | 600.0 ± 50.0 | W | RADIUS | RADIUS |
| G | .781 ± .010 | 20.00 ± 0.30 | X | .032 ± .002 | 0.82 ± 0.04 |
| H | 2.16 ± .010 | 55.0 ± 0.30 | Y | .110 ± .004 | 2.80 ± 0.10 |
| J | 2.16 ± .010 | 55.0 ± 0.30 | Z | .104 ± .010 | 2.65 ± 0.30 |
| K | 5.689 ± .008 | 144.50 ± 0.20 | AA | .051 ± .010 DIA. | 1.30 ± 0.30 DIA. |
| L | 3.252 ± .008 | 82.60 ± 1.00 | AB | .54 ± .020 | 14.3 ± 0.50 |
| M | .46 MAX. | 11.7 MAX. | AC | .295 MAX. | 7.50 MAX. |
| N | 3.19 MAX. | 81.0 MAX. | AD | 1.71 | 45.0 |
| P | 2.81 MAX. | 73.0 MAX. | AE | .63 | 16.0 |
| | | | AF | .13 ± .02 | 3.2 ± 0.5 |
| | | | AG | 5" ± 1" | 5" ± 1" |
| | | | AH | .24 ± .02 | 6.0 ± 0.5 |
| | | | AJ | .63 MIN. | 16.0 MIN. |



NOTE: SAME AS TYPE LF EXCEPT AS SHOWN
(.XX) INCH DIM.

FIG. 12 - TYPE UF
RECTANGULAR SEALED BEAM HEADLAMP UNIT

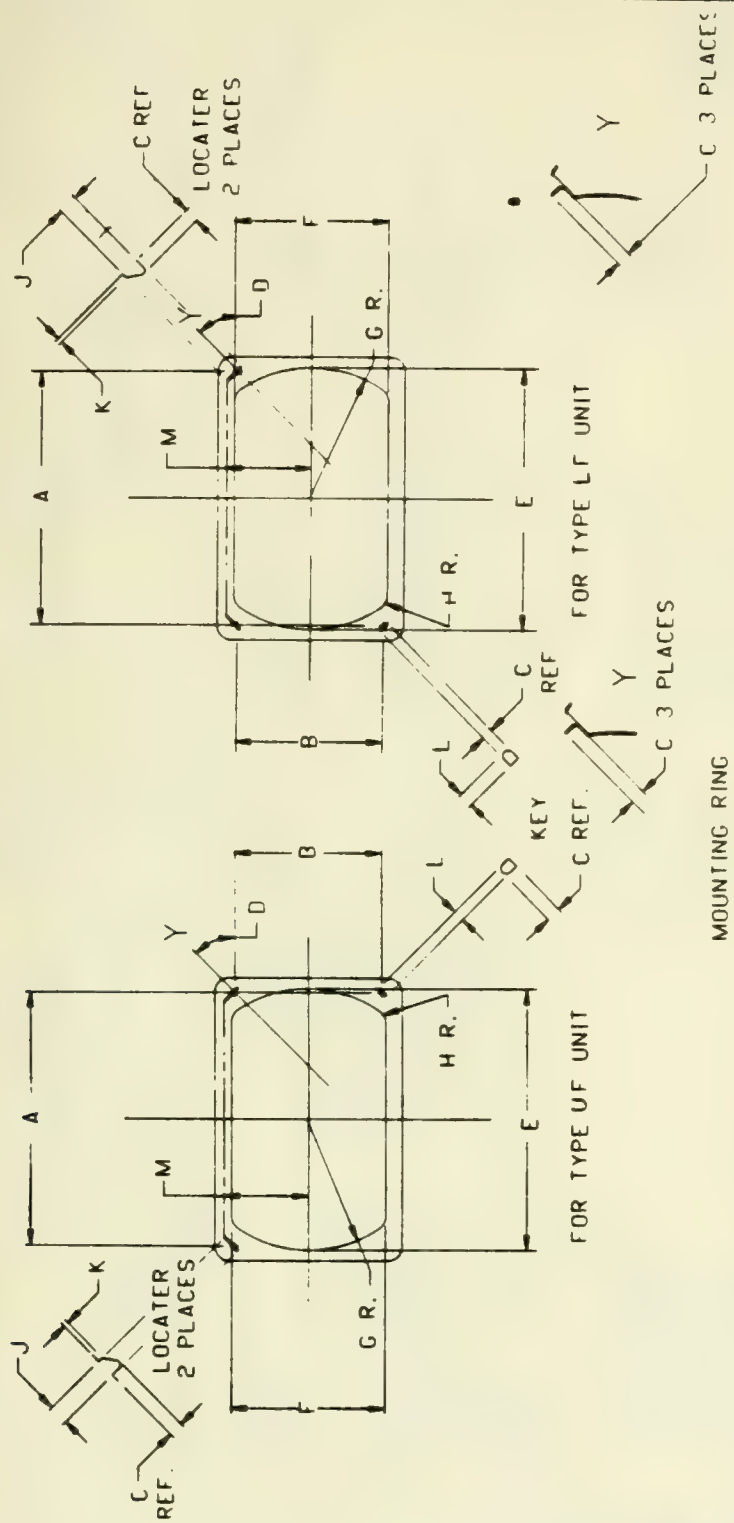


FIG. 13 - FRONT VIEW OF KEYS
OR LOCATORS FOR TYPE LF AND UF
RECTANGULAR SEALED BEAM HEADLAMP
UNIT MOUNTING RINGS

| LETTER | INCH | MM |
|--------|--------------|---------------|
| A | 5.433 ± .012 | 138.00 ± 0.30 |
| B | 3.150 ± .012 | 80.00 ± 0.30 |
| C | .315 ± .02 | 8.0 ± 0.5 |
| D | 45° 3 PLACES | 45° 3 PLACES |
| E | 5.63 ± .010 | 143.0 ± 0.30 |
| F | 3.307 ± .010 | 84.00 ± 0.30 |
| G | 2.79 ± .12 | 71.0 ± 3.0 |
| H | .32 ± .04 | 8.0 ± 1.0 |
| J | .39 ± .04 | 10.0 ± 1.0 |
| K | .17 ± .07 | 4.3 ± 1.7 |
| L | .24 ± .04 | 6.0 ± 1.0 |
| M | 1.823 ± .013 | 46.30 ± 0.30 |

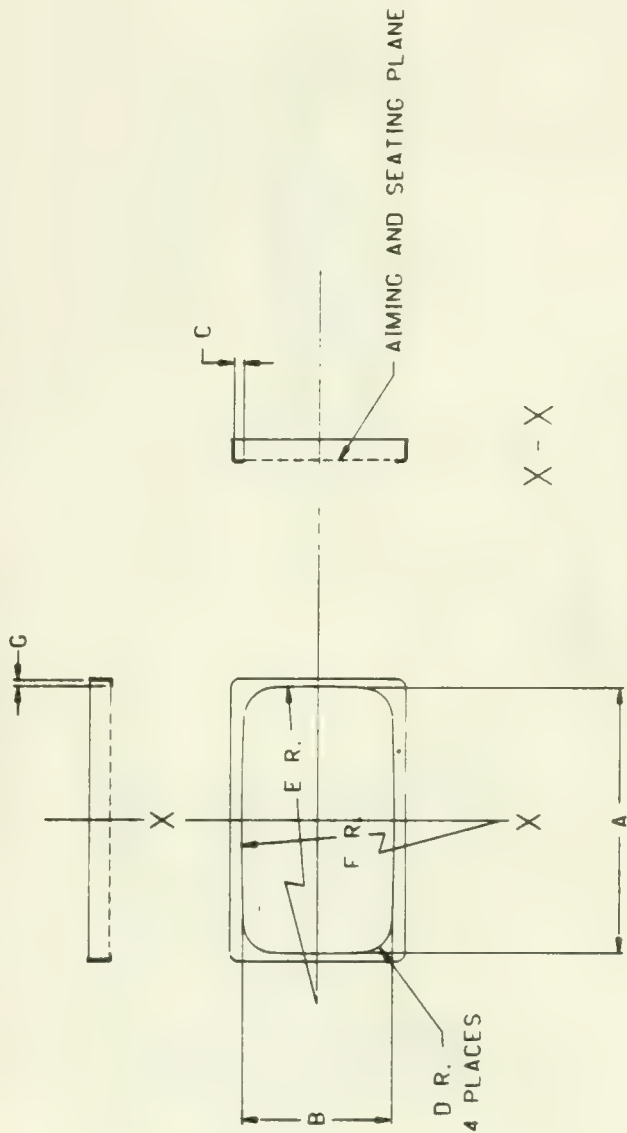


FIG. 14 - AIMING/SEATING RING
FOR TYPE LF AND UF RECTANGULAR SEALED
BEAM HEADLAMP UNITS

| LETTER | INCH | MM |
|--------|--------------|----------------|
| A | 5.721 ± .006 | 145.30 ± 0.30 |
| B | 3.284 ± .006 | 83.40 ± 0.30 |
| C | .213 MIN. | 5.40 MIN. |
| D | .670 MAX. | 17.00 MAX. |
| E | 23.7 ± 2.0 | 602.2 ± 50.0 |
| F | 63.0 ± 3.93 | 1600.0 ± 100.0 |
| G | .134 MIN. | 3.40 MIN. |

FIG. 15

PHOTOMETRIC TEST POINT VALUES

| UPPER BEAM | | | LOWER BEAM | | |
|---------------------|-------------|-------------|----------------------|--------------------|-------------|
| Test Points degb | cd. max. | cd. min. | Test Points degb | cd. max. | cd. min. |
| 2U-V | -- | 1,500 | 10U-90U ^a | 125 | -- |
| 1U-3R and 3L | -- | 5,000 | 1U-1-1/2L to L | 700 | -- |
| H-V | 70,000 | 40,000 | 1/2U-1-1/2L to L | 1,000 | -- |
| | | | 1/2D-1-1/2L to L | 3,000 | -- |
| | | | 1-1/2U-1R to R | 1,400 ^b | -- |
| H-3R and 3L | -- | 15,000 | 1/2U-1R to 3R | 2,700 | -- |
| H-6R and 6L | -- | 5,000 | 1/2D-1-1/2R | 20,000 | 10,000 |
| H-9R and 9L | -- | 3,000 | 1D-6L | -- | 1,000 |
| H-12R and 12L | -- | 1,500 | 1-1/2D-2R | -- | 15,000 |
| 1-1/2D-V | -- | 5,000 | 1-1/2D-9L and 9R | -- | 1,000 |
| 1-1/2D-9R and 9L | -- | 2,000 | 2D-15L and 15R | -- | 850 |
| 2-1/2D-V | -- | 2,500 | 4D-4R | 12,500 | -- |
| 2-1/2D-12R and 12L | -- | 1,000 | | | |
| 4D-V | 5,000 | -- | | | |

^aFrom the normally exposed surface of the lens face.

^bA tolerance of $\pm 1/4$ deg in location may be allowed for at any test point.

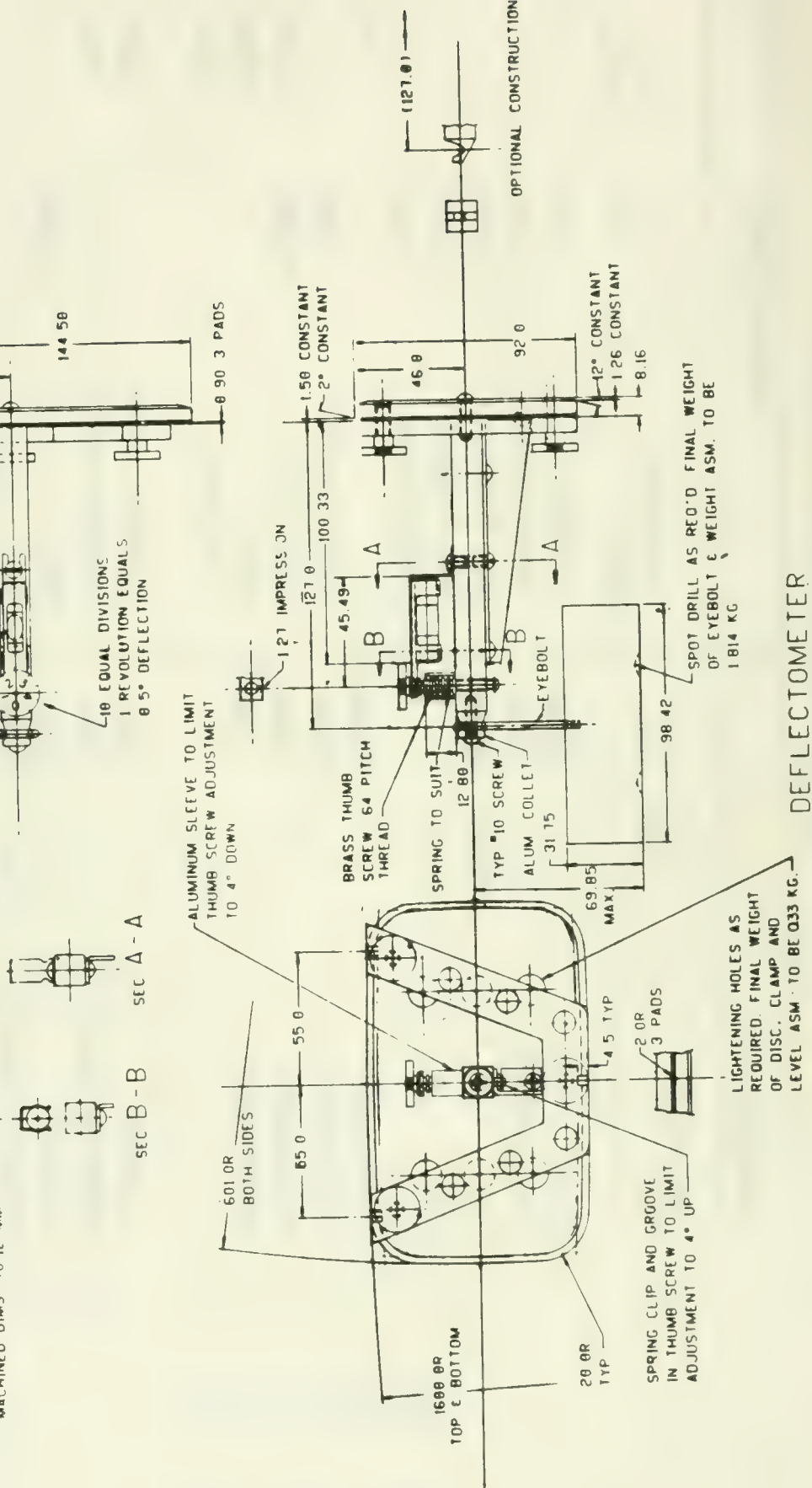
HEADLAMP TEST FIXTURE

92 X 150 MM

DIMENSIONS ARE IN MM
MACHINE MATERIALS

- DISC, ARM, BRACE & CLAMP
ALUM - SAE-AA-6061-T6 OR EQUIV
- COIL SPRING & LEVEL CLIP
SPRING STEEL SAE 1050 - CADMIUM PLATE
- WEIGHT & EYEBOLT ASM
STEEL - CADMIUM PLATE
- SCREWS
ALUM
- MACHINE THREADS
MACHINED DIMS ± 0.12 MM

- (1) 5.08 BUBBLE MOVEMENT
MUST INDICATE $\pm 0.25^\circ$
SENSITIVITY OR BETTER
- (2) MUST BE ACCURATE TO
WITHIN $\pm 0.05^\circ$ THRU
A RANGE OF $\pm 4^\circ$



MOTOR VEHICLE SAFETY STANDARD NO. 108

Lamps, Reflective Devices, and Associated Equipment—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, Buses, Trailers, and Motorcycles

(Docket No. 69-18)

S1. Purpose and scope. This standard specifies requirements for original and replacement lamps, reflective devices, and associated equipment necessary for signaling and for the safe operation of motor vehicles during darkness and other conditions of reduced visibility.

S2. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, buses, trailers (except pole trailers and trailer converter dollies), and motorcycles, and to lamps, reflective devices, and associated equipment for replacement of like equipment on vehicles to which this standard applies.

S3. Definitions. “Flash” means a cycle of activation and deactivation of a lamp by automatic means, continuing until stopped either automatically or manually.

“Headlamp test fixture” means a device designed to support a replaceable bulb headlamp in the test position specified in the laboratory tests in S4.1.1.36.(d), and whose mounting hardware and components are those necessary to operate the headlamp as installed in a motor vehicle.

“Replaceable bulb headlamp” means a headlamp comprising a bonded lens and reflector assembly, and a standardized replaceable light source.

“Seasoning” means a process of energizing the filament of a headlamp, at design voltage, for a period of time equal to 1 percent of average rated laboratory life.

“Standardized replaceable light source” means an assembly of a headlamp bulb, base, and terminals, as described in Figure [3]. (48 F.R. 44818—September 30, 1983. Effective: September 30, 1983)

“Type 1” means a headlamp, with only an upper beam filament, whose identification code begins with the numeral “1.”

“Type 2” means a headlamp, with both upper and lower beam filaments, whose identification code begins with the numeral “2.”

S4. Requirements.

S4.1 Required motor-vehicle lighting equipment.

S4.1.1. Except as provided in succeeding paragraphs of S4.1.1., each vehicle shall be equipped with at least the number of lamps, reflective devices, and associated equipment specified in Tables I and III, as applicable. Required equipment shall be designed to conform to the SAE Standards or Recommended Practices referenced in those tables. Table I applies to multipurpose passenger vehicles, trucks, trailers, and buses, 80 or more inches in overall width. Table III applies to passenger cars and motorcycles and to multipurpose passenger vehicles, trucks, trailers, and buses less than 80 inches in overall width.

S4.1.1.1. A truck tractor need not be equipped with turn-signal lamps mounted on the rear if the turn signal lamps at or near the front are so constructed (double-faced) and so located that they meet the requirements for double-faced turn signals specified in SAE Standard J588e, “Turn Signal Lamps,” September 1970.

S4.1.1.2. A truck tractor need not be equipped with any rear side-marker devices, rear clearance lamps, and rear identification lamps.

S4.1.1.3. Intermediate side-marker devices are not required on vehicles less than 30 feet in overall length.

S4.1.1.4. Reflective material conforming to Federal Specification L-S-300, “Sheeting and

Tape, Reflective; Non-exposed Lens, Adhesive Backing," September 7, 1965, may be used for side reflex reflectors if this material, as used on the vehicle, meets the performance standards in either Table I or Table IA of SAE Standard J594f, "Reflex Reflectors," January 1977.

S4.1.1.5 The turn-signal operating unit on each passenger car and multipurpose passenger vehicle, truck, and bus less than 80 inches in overall width, manufactured on or after January 1, 1973, shall be self-cancelling by steering wheel rotation and capable of cancellation by a manually operated control.

S4.1.1.6. Each stoplamp on any motor vehicle manufactured between January 1, 1973, and September 1, 1978, may be designed to conform to SAE Standard J586b, *Stop Lamps*, June 1966. It shall meet the photometric minimum candlepower requirements for Class A red turn-signal lamps specified in SAE Standard J575d, *Tests for Motor Vehicle Lighting Devices and Components*, August 1967. Each such lamp on a passenger car and on a multipurpose passenger vehicle, truck, trailer or bus less than 80 inches in overall width shall have an effective projected luminous area not less than 3½ square inches. If multiple compartment lamps or multiple lamps are used, the effective projected luminous area of each compartment or lamp shall be not less than 3½ square inches; however, the photometric requirements may be met by a combination of compartments or lamps.

S4.1.1.7. Each turn signal lamp on any motor vehicle except motorcycles, manufactured between January 1, 1972, and September 1, 1978, may be designed to conform to SAE Standard J588d, *Turn Signal Lamps*, June 1966, and shall meet the photometric minimum candlepower requirements for Class A turn-signal lamps specified in SAE Standard J575d, *Tests for Motor Vehicle Lighting Devices and Components*, August 1967. Each such lamp on a passenger car and on a multipurpose passenger vehicle, truck, trailer or bus less than 80 inches in overall width shall have an effective projected luminous area not less than 3½ square inches. If multiple compartment lamps or multiple lamps are used, the effective projected luminous area of each compartment or lamp shall be not less than 3½ square inches; however, the photometric

requirements may be met by a combination of compartments or lamps. Each such lamp on a multipurpose passenger vehicle, truck, trailer or bus 80 inches or more in overall width shall have an effective projected luminous area not less than 12 square inches.

S4.1.1.8 For each motor vehicle less than 30 feet in overall length, the photometric-minimum candlepower requirements for side marker lamps specified in SAE Standard J592e, "Clearance, Side Marker, and Identification Lamps," July 1972, may be met for all inboard test points at a distance of 15 feet from the vehicle and on a vertical plane that is perpendicular to the longitudinal axis of the vehicle and located midway between the front and rear side-marker lamps.

S4.1.1.9. Boat trailers need not be equipped with both front and rear clearance lamps, provided an amber (to front) and red (to rear) clearance lamp is located at or near the midpoint on each side of the trailer so as to indicate its extreme width.

S4.1.1.10. Multiple license-plate lamps and backup lamps may be used to fulfill the requirements of the SAE Standards applicable to such lamps referenced in Tables I and III.

S4.1.1.11. [A parking lamp, taillamp, stop lamp, or turn-signal lamp shall meet the minimum percentage specified in Figure 1a of the corresponding minimum allowable value specified in Figure 1b. The maximum candlepower output of each stop, turn signal, tail and parking lamp shall not exceed that prescribed in Figure 1b. The values specified in Figure 1a and Figure 1b are substituted for those specified in Table I of the following SAE Standards: J222 *Parking Lamps*, J585e; *Taillamps* (at H or above), J586c *Stop lamps* and J588e; *Turn Signal Lamps*. (49 F.R. 46386—November 26, 1984. Effective: December 26, 1984)]

S4.1.1.12. [A parking lamp, taillamp, stop lamp, or turn-signal lamp is not required to meet the minimum photometric value at each test point specified in this standard if the sum of the percentage of the minimum candlepower measured at the test points is not less than that specified for each group listed in Figure 1c. (49 F.R. 46386—November 26, 1984. Effective: December 26, 1984)]

4.1.13. Instead of headlamps designed to conform to the requirements of Table I and Table III, a car, multipurpose passenger vehicle, truck, or bus may be equipped with two white headlamps designed to conform to:

(a) the requirements of SAE Standard J571d, "Dimensional Specifications for Sealed Beam Headlamp Units", June 1976, that apply to Type 2A sealed beam headlamp units, except that the designation "2A" shall not appear on the lens, and the ground terminal shall be rotated clockwise 45 degrees; and

(b) the requirements of SAE Standard H579c "Sealed Beam Headlamp Units for Motor Vehicles," December 1974, and subreferenced standards, that apply to Type 2 headlamp units;

(c) SAE Standard J580b, "Sealed Beam Headlamp Assembly," February 1974.

S4.1.1.14. The lens of each headlamp that conforms with paragraph S4.1.1.13 shall be marked with the symbol "DOT" (printed horizontally) or "DOT" (printed vertically) which shall constitute a certification that the headlamp conforms to all applicable Federal motor vehicle safety standards, and shall be labeled 2E1.

S4.1.1.15. At a voltage of 12.8 volts, the maximum design wattage for the upper and lower beams of each Type 2E1 headlamp shall be 70 watts for the upper beam and 60 watts for the lower beam.

S4.1.1.16. All passenger cars and multipurpose passenger vehicles, trucks, and buses of less than 80 inches overall width shall be equipped with turn signal operating units designed to complete a durability test of 100,000 cycles.

S4.1.1.17. A trailer that is less than 30 inches in overall width may be equipped with only one of each of the following lamps and reflective devices, located at or near its vertical centerline: Taillamp, stoplamp, and rear reflex reflector.

S4.1.1.18 A trailer that is less than 6 feet in overall length, including the trailer tongue, need not be equipped with front side-marker lamps and front side reflex reflectors.

| Test points (deg) | | Turn signal | Stop | Park- ing | Tail |
|-------------------|----------|----------------|------|--------------|------|
| 10U, 10D | 5L, 5R | 20 | 20 | 20 | 20 |
| | 20L, 20R | 12.5 | 12.5 | 10 | 15 |
| 5U, 5D | 10L, 10R | 37.5 | 37.5 | 20 | 40 |
| | V | 87.5 | 87.5 | 70 | 90 |
| H | 10L, 10R | 50 | 50 | 35 | 40 |
| | 5L, 5R | 100 | 100 | 90 | 100 |
| | V | 100 | 100 | 100 | 100 |

FIGURE 1a.—Required percentages of minimum candlepower of Figure 1b.

| Lamp | Lighted Sections | | |
|---|------------------|---------|----------|
| | 1 | 2 | 3 |
| Stop | 80/300 | 95/360 | 110/420 |
| Tail | 2/18 | 3.5/20 | 5.0/25 |
| Parking | 4.0 | | |
| Red turn signal | 80/300 | 95/360 | 110/420 |
| Yellow turn signal rear | 130/750 | 150/900 | 175/1050 |
| Yellow turn signal front | 220/ | 240/ | 275/ |
| Yellow turn signal front ¹ | 500/ | 600/ | 685/ |

FIGURE 1b.—Minimum and maximum allowable candlepower values.

¹ Values shall apply when the optical axis (filament center) of the front-turn signal is at a spacing less than 4 inches (10 centimeters) from the lighted edge of the headlamp unit providing the lower beam, or from the lighted edge of any additional lamp installed as original equipment or used in lieu of the lower beam.

| Groups and test points | Turn signal | Stop | Park- ing | Tail |
|---|----------------|------|--------------|------|
| 1 10U-5L, 5U-20L, 5D-20L, 10D-5L | 65 | 65 | 60 | 70 |
| 2 5U-10L, H-10L, 5D-10L . | 125 | 125 | 75 | 120 |
| 3 H-5L, 5U-V, H-V, 5D-V, H-5R | 475 | 475 | 420 | 480 |
| 4 5U-10R, H-10R, 5D-10R . | 125 | 125 | 75 | 120 |
| 5 10U-5R, 5U-20R, 5D-20R, 10D-5R | 65 | 65 | 60 | 70 |

FIGURE 1c.—Sum of the percentages of grouped minimum candlepower. (49 F.R 46386—November 26, 1984. Effective: December 26, 1984)】

S4.1.1.18 A trailer that is less than 6 feet in overall length, including the trailer tongue, need not be equipped with front side-marker lamps and front side reflex reflectors.

S4.1.1.19. A lamp manufactured on or after January 1, 1974, and designed to use a type of bulb that has not been assigned a mean spherical

candlepower rating by its manufacturer and is not listed in SAE Standard J573d, "Lamp Bulbs and Sealed Units," December 1968, shall meet the applicable requirements of this standard when used with any bulb of the type specified by the lamp manufacturer, operated at the bulb's design voltage. A lamp that contains a sealed-in bulb shall meet these requirements with the bulb operated at the bulb's design voltage.

S4.1.1.20. Except for a lamp having a sealed-in bulb, a lamp manufactured on or after January 1, 1974, shall meet the applicable requirements of this standard when tested with a bulb whose filament is positioned within ± 0.10 inch of the nominal design position specified in SAE Standard J573d, "Lamp Bulbs and Sealed Units," December 1968, or specified by the bulb manufacturer.

S4.1.1.21. The lens of each headlamp designed to conform to SAE Standard J579c, "Sealed Beam Headlamp Units for Motor Vehicles," December 1974, manufactured on or after July 1, 1979, shall be marked with the symbol

"D
"DOT" or O
T"

which shall constitute a certification that the headlamp conforms to applicable Federal motor vehicle safety standards, and with one of the following designations, as appropriate:

(a) A lens for rectangular headlamp (100 × 165 mm) incorporating an upper beam only, shall be labeled 1A1.

(b) A lens for a rectangular headlamp (100 × 165 mm), incorporating both an upper beam and a lower beam shall be labeled 2A1.

(c) A lens for a rectangular headlamp (142 × 200 mm), incorporating both an upper beam and a lower beam, shall be labeled 2B1.

(d) A lens for a circular headlamp (146-mm diameter), incorporating an upper beam only, shall be labeled 1C1.

(e) A lens for a circular headlamp (146-mm diameter), incorporating both an upper and a lower beam shall be labeled 2C1.

(f) A lens for a circular headlamp (178-mm diameter), incorporating both an upper beam and a lower beam, shall be labeled 2D1.

(e) A lens for a circular headlamp (146-mm diameter), incorporating both an upper and a lower beam shall be labeled 2C1.

(f) A lens for a circular headlamp (178-mm diameter), incorporating both an upper beam and a lower beam, shall be labeled 2D1.

The lens of each headlamp designed to conform to SAE Standard J579c and manufactured before July 1, 1979, may be labeled as specified above.

S4.1.1.22. A backup lamp is not required to meet the minimum photometric values at each test point specified in Table I of SAE Standard J593c, "Backup Lamps" if the sum of the candlepower measured at the test points within each group listed in Figure 2 is not less than the group totals specified in that figure.

S4.1.1.23. Variable-load turn-signal flashers shall comply with voltage-drop and durability requirements with the maximum design load connected and shall comply with starting-time, flash rate, and percent current "on" time requirements both with the minimum and with the maximum design load connected.

S4.1.1.24. The lowest voltage drop for turn-signal flashers and hazard warning-signal flashers measured between the input and load terminals, shall not exceed 0.8 volt.

S4.1.1.25. [The dimensional specifications for headlamp-unit retaining rings of Figures 2(B), 5(B), and 8(B) of SAE Standard J571d, "Dimensional Specifications for Sealed Beam Headlamp Units," June 1976, and of Figure 2(B), SAE Recommended Practice J1132 "142 mm × 200 mm Sealed Beam Headlamp Unit," January 1976, do not apply. (47 F.R. 25149—June 10, 1982. Effective: June 10, 1982)]

S4.1.1.26. A motor-driven cycle whose speed attainable in 1 mile is 30 mph or less need not be equipped with turn-signal lamps.

S4.1.1.27. A motor-driven cycle whose speed attainable in 1 mile is 30 mph or less may be equipped with a stop lamp whose effective projected luminous lens area is not less than $3\frac{1}{2}$ square inches and whose photometric output for the groups of test points specified in Figure 1 is at least one-half of the minimum values set forth in that figure.

S4.1.1.28. Each taillamp on any motor vehicle manufactured before July 1, 1980 may be designed to conform to SAE Standard J585d, "Taillamps," August 1970.

| Group | Test point, degrees | Total for Group, cd (see notes a, b) |
|----------------|---------------------|--|
| 1 ^a | 45L-5U | 45 |
| | 45L-H | |
| | 45L-5D | |
| 2 ^a | 30L-H | 50 |
| | 30L-5-D | |
| | 10L-10U | |
| 3 | 10L-5U | 100 |
| | V-10U | |
| | V-5U | |
| | 10R-10U | |
| | 10R-5U | |
| | 10L-H | |
| 4 | 10L-5D | 360 |
| | V-H | |
| | V-5D | |
| | 10R-H | |
| | 10R-5D | |
| | 30R-H | |
| 5 ^a | 30R-5D | 50 |
| | 45R-5U | |
| 6 ^a | 45R-H | 45 |
| | 45R-5D | |

FIGURE 2—Minimum luminous intensity requirements for backup lamps

^a When two lamps of the same or symmetrically opposite design are used, the reading along the vertical axis and the averages of the readings for the same angles left and right of vertical for one lamp shall be used to determine compliance with the requirements. If two lamps of differing designs are used, they shall be tested individually and the values added to determine that the combined units meet twice the candela requirements.

^b When only one backup lamp is used on the vehicle, it shall be tested to twice the candela requirements.

S4.1.1.29. Each turn signal lamp on a motorcycle manufactured between January 1, 1973, and September 1, 1978, may be designed to conform to SAE Standard J588d, "Turn Signal Lamps," June 1966.

S4.1.1.30. Except as provided in paragraph S4.1.1.12. of this standard, each turn-signal lamp on a motorcycle shall meet one-half of the minimum photometric values at each test point specified for Class A turn signal lamps in SAE Standard J575d, "Tests for Motor Vehicle Lighting Devices and Components," August 1967, or in SAE Standard J588e, "Turn Signal Lamps," September 1970, as applicable.

S4.1.1.31. Each turn signal lamp on a motorcycle manufactured on and after January 1, 1973, shall have an effective projected luminous area not less than 3½ square inches.

S4.1.1.32 Note 6 of Table 1 in SAE Standard J588e, "Turn Signal Lamps," September 1970,

does not apply. A stoplamp that is not optically combined with a turn signal lamp shall remain activated when the turn-signal is flashing.

S4.1.1.33. At a voltage of 12.8 volts, the maximum design wattage for upper and lower beams on headlamps designed to conform to SAE Standard J579c, "Sealed Beam Headlamp Units for Motor Vehicles," December 1974, shall be as follows: 55 watts for upper beam on Type 1A1 and Type 1C1, 43 watts for upper beam and 65 watts for lower beam on Type 2A1 and Type 2C1, 70 watts for upper beam and 60 watts for lower beam on Type 2B1, 65 watts for upper beam and 55 watts for lower beam on Type 2D1.

S4.1.1.34. A motorcycle may be equipped with one of the following four headlighting systems:

| System | Headlamp type | Number of headlamps |
|--------|--|---------------------|
| 1 | Type 1C1 or Type 1 (5¾ in.) _____ and either Type 2C1 or Type 2 (5¾ in.) _____ | 1 lamp 1 lamp |
| 2 | Type 2D1 or Type 1 (7 in.) _____ | 1 or 2 lamps |
| 3 | Type 1A1 or Type 1A _____ and either Type 2A1 or Type 2A _____ | 1 lamp 2 lamps |
| 4 | Type 2B1 or Type 1B _____ | 1 or 2 lamps |
| 5 | Type 2E1 _____ | 1 lamp |
| 6 | Type UF _____ and Type LF _____ | 1 1 |

(49 F.R. 50176—December 27, 1984. Effective: July 1, 1985)】

S4.1.1.35. Each headlamp on a passenger car, multipurpose passenger vehicle, truck, or bus manufactured on or before September 30, 1979, may be designed to conform with SAE Standard J580a, *Sealed Beam Headlamp*, June 1966.

S4.1.1.36. Instead of being equipped with a headlighting system specified in Table I or Table III, a passenger car, multipurpose passenger vehicle, truck, bus, or motorcycle manufactured on or after July 1, 1983, may be equipped with a system of one or two replaceable bulb headlamps, if the vehicle is a motorcycle, or two replaceable bulb headlamps, if the vehicle is a passenger car, multipurpose passenger vehicle, truck, or bus, designed to conform to the following requirements. [(49 F.R. 47396—December 4, 1984. Effective: September 1, 1985)】

(a) (1) Each replaceable-bulb headlamp shall include components which are designed to conform to the applicable specifications of paragraph S4.1.1.38 and Figure 3—*Specifications For The Standardized Replaceable Light Source*, including filament location, base and socket dimensions, electrical connector dimensions, and maximum design wattage.

(2) The exterior face of each replaceable-bulb headlamp lens shall have three pads which meet the requirements of Figure 4, *Dimensional Specifications for Location of Aiming Pads on Replaceable Bulb Headlamp Units*, and which form an aiming plane for mechanically adjusting and inspecting headlamp aim. The exterior lens face shall have molded into it the specific settings applicable to that headlamp as designed to be installed in the vehicle, for each of the two adjustable legs of an aiming-device locating plate conforming to Figure 9: e.g., "11H 17V" requires the horizontal aiming-pad leg to be set in position 11, and the vertical aiming-pad leg to be set in position 17.

(b) Each replaceable-bulb headlamp shall meet the following sections of the specified SAE Standards and Recommended Practices:

(1) Section 4.6—Photometry of SAE J575, "Tests for Motor Vehicle Lighting Devices and Components" June 80.

(2) Section 3.1—Test Voltage, and Section 3.5—Photometric Design Requirements, including Figure 3 and Table 1 of SAE J579c "Sealed Beam Headlamp Units for Motor Vehicles" December 1978, except that the aiming plane on the lens shall be at horizontal and vertical distances to the photometer axis as inscribed on the lens of a replaceable-bulb headlamp.

(3) Section 5—General Requirements, Section 6—Design Requirements and Tests (to the extent listed below), Section 6.1—Aiming Adjustment Test, Section 6.2—Inward Force Test, and Section 6.4—Connector Tests of SAE J580, "Sealed Beam Headlamp Assembly" August 1979.

(c) A headlamp with a glass lens need not meet the following tests of the sections specified: abrasion resistance (S6.2), chemical resistance (S6.4), and impact (S6.9). If, in addition to a glass lens, the headlamp uses a non-plastic reflector, it need not meet the internal heat test of section S6.7.2.

(d) When tested according to any of the procedures indicated in subparagraphs (1) through (8), a replaceable-bulb headlamp shall meet the appropriate requirement:

(1) After an abrasion test conducted in accordance with S6.2, the headlamp shall meet the photometric requirements of SAE J579c, "Sealed Beam Headlamp Units for Motor Vehicles" December 1978.

(2) After a vibration test conducted in accordance with S6.3, there shall be no evidence of loose or broken parts visible without magnification, except that the filament need not be unbroken.

(3) After a chemical-resistance test involving exposure to any of the fluids listed in S6.4, there shall be no surface deterioration, coating delamination, fractures, deterioration of bonding materials, color bleeding or color pickup visible without magnification, and the headlamp shall meet the photometric requirements of SAE J579c, "Sealed Beam Headlamp Units for Motor Vehicles" December 1978.

(4) After a corrosion test conducted in accordance with S6.5, there shall be no evidence of external or internal corrosion or rust visible without magnification. Loss of adhesion of any applied coating shall not occur more than .125 inch (3.2 mm) from any sharp edge on the inside or outside. Corrosion may occur on terminals only if the current produced during the test of Paragraph S6.5(c) is not less than 9.7 amperes. [(49 F.R. 47396—December 4, 1984. Effective: September 1, 1985)]

(5) After a dust test conducted in accordance with S6.6, the headlamp shall meet the photometric requirements of SAE J579c, "Sealed Beam Headlamp Units for Motor Vehicles" December 1978.

(6) The headlamp shall first meet the requirements of paragraph (d) (6) (A) and then those of paragraph (d) (6) (B).

(A) After a temperature-cycle test conducted in accordance with S6.7.1, the headlamp shall show no evidence of delamination, fractures, entry of moisture or deterioration of bonding material, color bleeding, warpage or deformation visible without magnification, or lens warpage greater than .118 inch (3 mm) when measured perpendicular to the aiming plane at the point of intersection of the mechanical axis with the exterior surface of the lens, and it shall meet the photometric requirements of SAE J579c, "Sealed Beam Headlamp Units for Motor Vehicles" December 1978.

(B) After an internal heat test conducted in accordance with S6.7.2, there shall be no lens warpage greater than .118 inch (3 mm) when measured perpendicular to the aiming plane at the point of intersection of the mechanical axis with the exterior surface of the lens, and it shall meet the photometric requirements of SAE J579c, "Sealed Beam Headlamp Units for Motor Vehicles" December 1978.

(7) After a humidity test conducted in accordance with S6.8, the inside of the headlamp shall show no evidence of delamination or moisture, fogging or condensation visible without magnification, and the headlamp shall meet the photometric requirements of SAE J579c, "Sealed Beam Headlamp Units for Motor Vehicles," December 1978.

(8) After an impact on a headlamp with a plastic lens, conducted in accordance with S6.9, there shall not be any fracture of the adhesion of lens coating or delamination of materials visible without magnification, and the lens shall not be broken, cracked, or chipped.

S4.1.1.37. Each lens-reflector unit manufactured as replacement equipment for a replaceable bulb headlamp system shall conform to the requirements of S4.1.1.36. when a standardized replaceable light source is inserted in it.

S4.1.1.38. Each standardized replaceable light source shall conform to the following requirements:

- (a) A silicone O-ring shall be provided.
- (b) The bulb portion of the standardized replaceable light source shall meet the requirements in paragraph (b) (1) through (b) (6) of this section.
- (1) The general specifications of the bulb shall be:

| | Low Beam | High Beam |
|-------------------------------------|------------|------------|
| Watts @ 12.8 V | 50 | 70 |
| Lumens (without black cap) @ 12.8 V | 1067 ± 7½% | 1736 ± 7½% |
| Average life @ 14.0 V | 320 hrs. | 150 hrs. |

- (2) The bulb filaments shall be subject to seasoning prior to wattage and lumens measurement.
- (3) Wattage and lumens measurements shall be made with the direct current test voltage regulated within one quarter of 1 percent.
- (4) Except for reference dimensions, and unless otherwise specified, a general tolerance of ±.004 in. (0.10 mm) shall apply to all linear dimensions and ±1°.00' shall apply to all angular dimensions.
- (5) Bulb, lead wires and/or terminals shall be installed in the base so as to provide an airtight seal.
- (6) After a bulb-deflection test conducted in accordance with S7, the permanent deflection of the glass envelope of each standardized replaceable light source shall not exceed .005 inch (.13 mm) in the direction of the applied force in the base.

S4.1.1.39. Each motor vehicle manufactured on or after July 1, 1983, and before July 1, 1984, which is equipped with a replaceable-bulb headlamp system shall also be provided with a spare standardized replaceable light source as original equipment for such vehicle.

S4.1.1.40. The lens of each replaceable bulb headlamp that conforms with this standard, and the side of the base of each standardized replaceable light source shall be marked with symbol

“D
“DOT” or O
T”

which shall constitute a certification that the headlamp or light source conforms to all applicable Federal motor vehicle safety standards.

S4.1.1.41. Each passenger car manufactured on or after September 1, 1985, shall be equipped with a high-mounted stoplamp which:

- (a) Shall have an effective projected luminous area not less than 4½ square inches.
- (b) Shall have a signal visible to the rear through a horizontal angle from 45 degrees to the left to 45 degrees to the right of the longitudinal axis of the vehicle.
- (c) Shall have the minimum photometric values in the amount and location listed in Figure 10, instead of those in Table 1 of SAE Recommended Practice J186a, *Supplemental High Mounted Stop and Rear Turn Signal Lamps*, September 1977.
- (d) Need not meet the requirements of paragraphs 3.1.6 Moisture Test, 3.1.7 Dust Test, and 3.1.8 Corrosion Test of SAE Recommended Practice J186a if it is mounted inside the vehicle.
- (e) Shall provide access for convenient replacement of the bulb without the use of special tools.

S4.1.1.42. A passenger car manufactured between August 1, 1984 and September 1, 1985, may be equipped with a high-mounted stop lamp that conforms to S4.3.1.8.

[S4.1.1.43 Instead of being equipped with a headlighting system specified in Table I or Table III, a passenger car, multipurpose passenger vehicle, truck or bus manufactured on or after July 1, 1985, may be equipped with a headlighting system of two Type UF and two Type LF headlamps designed to conform to:

- (a) The dimensions specified in Figures 11, 12, 13, and 14.
- (b) The photometric requirements of Figure 15.
- (c) The requirements of SAE Standard J579c *Sealed Beam Headlamp Units for Motor Vehicles*, December 1978, with the following exceptions:

- (1) The definitions in sections 2.4 through 2.11 do not apply.
- (2) In Section 2.12, the definition of “Mechanically Aimable Sealed Beam Unit” is: “A unit having three pads, defining a mechanical aiming plane, used to adjust and inspect the aim of the unit when installed on the vehicle.”
- (3) In Section 2.13, the definition of “Aiming Plane” is: “A plane defined by the three aiming pads.”
- (4) Section 3.4 does not apply.
- (5) Tables 1 and 2, and Figures 1 and 2 do not apply.

(6) In Section 3.5.1 and 3.5.3, references to "Tables 1 and 2" and Figure 3 are replaced by "Figure 15."

(7) Section 3.6 does not apply.

(d) When tested in accordance with Section 3.5.2 of SAE Standard J579c *Sealed Beam Headlamp Units for Motor Vehicles*, December 1978, the mounted assembly (either Type UF or Type LF headlamps, respective mounting ring, aiming ring, and aim adjustment mechanism) shall be designed to conform to meet the requirements of Figure 15 for upper or lower beams respectively without reaim when any conforming Type UF or LF headlamp is tested and replaced by another conforming headlamp of similar type.

(e) The requirements of SAE Standard J580, August 1979 *Sealed Beam Headlamp Assembly*, with the following exceptions:

(1) Section 2.2 Mounting Ring reads: "the adjustable ring upon which the sealed beam unit is mounted and which forces the sealed beam unit to seat against the aiming ring when assembled into a sealed beam headlamp assembly."

(2) The definition "2.3 Aiming Ring" reads: "The clamping ring that retains the sealed beam unit against the mounting ring, and that provides an interface between the unit's aiming/seating pads and the headlamp aimer adapter (locating plate)."

(3) In Section 3, the correct version of SAE J575 is "SAE 575f (April 1975).

(4) Section 4 does not apply.

(5) Section 5.1 reads: "Headlamps shall be designed so that they may be inspected and aimed by mechanical aimers as specified in SAE J602 October 1980, without the removal of any ornamental trim rings or other parts."

(6) Section 6.1.1 reads: "When the headlamp assembly is tested in the laboratory, a minimum aiming adjustment of ± 2.5 deg. shall be provided in the horizontal plane and ± 4 deg. in the vertical plane."

(7) Section 6.1.2 reads: "... through an angle of ± 2.5 deg. and ± 4 deg., respectively."

(8) Section 6.3 is retitled "Retaining Ring/Aiming Ring Tests."

(9) In Section 6.3.2 add the flange thickness "92x150 mm 0.340 in. 8.6 mm)"

(10) Figures 2, 3, and 4 do not apply, and the reference to them in Section 6.5 is replaced by "Figure 16, Deflectometer, of Federal Motor Vehicle Safety Standard No. 108."

S4.1.1.44 The lens of each headlamp designed to conform to paragraph S4.1.1.43 shall be marked with:

(a) The designation "F" if it provides an upper beam, or "LF" if it provides a lower beam; and

(b) The symbol "DOT" (either horizontally or vertically) which shall constitute a certification that the headlamp conforms to all applicable Federal motor vehicle safety standards.

S4.1.1.45 Each headlamp designed to conform to paragraph S4.1.1.43 shall also be designed to conform to the following specifications:

| | Type LF | Type UF |
|---|---------|---------|
| Watts @ 12.8 V (design voltage | 60 max. | 70 max. |
| Average Life @ 14.0 V (rated voltage) | 320 hr. | 150 hr. |

(49 F.R. 50176—December 27, 1984. Effective: July 1, 1985)]

S4.1.2. Plastic materials used for optical parts such as lenses and reflectors shall conform to SAE Recommended Practice J576c, May 1970, except that:

(a) Plastic materials manufactured before January 1, 1976, may conform to SAE J576b, August 1966;

(b) Plastic lenses used for inner lenses or those covered by another material and not exposed directly to sunlight shall meet the requirements of paragraphs 3.4 and 4.2 of SAE J576b, or J576c, as applicable, when covered by the outer lens or other material;

(c) After the outdoor-exposure test, the haze and loss of surface luster of plastic materials used for lamp lenses shall not be greater than 30 percent haze as measured by ASTM-1003-61, "Haze and Luminous Transmittance of Transparent Plastics"; and

(d) After the outdoor-exposure test, plastic materials used for reflex reflectors shall meet the appearance requirements of paragraph 4.2.2 of SAE J576b or J576c, as applicable.

S4.1.3 No additional lamp, reflective device, or other motor vehicle equipment shall be installed that impairs the effectiveness of lighting equipment required by this standard.

S4.1.4 Each schoolbus shall be equipped with a system of either:

(a) Four red signal lamps designed to conform to SAE Standard J887, "School Bus Red Signal Lamps," July 1964, and installed in accordance with that standard; or

(b) Four red signal lamps designed to conform to SAE Standard J887, "School Bus Red Signal

Lamps," July 1964, and four amber signal lamps designed to conform to that standard, except for their color, and except that their candlepower shall be at least 2½ times that specified for red signal lamps. Both red and amber lamps shall be installed in accordance with SAE Standard J887, except that:

(i) Each amber signal lamp shall be located near each red signal lamp, at the same level, but closer to the vertical centerline of the bus; and

(ii) The system shall be wired so that the amber signal lamps are activated only by manual or foot operation, and if activated, are automatically deactivated and the red signal lamps automatically activated when the bus entrance door is opened.

S4.1.5. The color in all lighting equipment covered by this standard shall comply with SAE Standard J578c, February 1977, "Color Specification for Electric Signal Lighting Devices," except that the color in lighting equipment manufactured on or before December 31, 1978, may comply with SAE Standard J578a, April 1965.

S4.2. Other requirements.

S4.2.1. The words "it is recommended that," "recommendations," or "should be" appearing in any SAE Standard or Recommended Practice referenced or subreferenced in this standard shall be read as setting forth mandatory requirements, except that the aiming pads on the lens face and the black area surrounding the signal lamp, recommended in SAE Standard J887, "School Bus Red Signal Lamps," July 1964, are not required.

S4.2.2. The words "Type 1 (5¾—)," "Type 2 (5¾—)," "Type 2 (7—)," "Type 1A," "Type 2A," and "Type 2B" appearing in any SAE Standard or Recommended Practice referenced or subreferenced in this standard shall also be read as setting forth requirements respectively for the following types of headlamps: 1C1, 2C1, 2D1, 1A1, 2A1, and 2B1.

S4.3. Location of required equipment.

S4.3.1 Except as provided in succeeding paragraphs of S4.3.1, each lamp, reflective device, and item of associated equipment shall be securely mounted on a rigid part of the vehicle other than glazing that is not designed to be removed except for repair, in accordance with the requirements of Table I or III and in locations specified in Table II (multipurpose passenger vehicles, trucks, trailers, and buses 80 or more inches in overall width) and Table IV (all passenger cars, and motorcycles, and multipurpose passenger vehicles, trucks, trailers, and buses less than 80 inches in overall width), as applicable.

S4.3.1.1. Except as provided in S4.3.1.1.1, each lamp and reflective device shall be located so that it meets the visibility requirements specified in any applicable SAE Standard or Recommended Practice. In addition, no part of the vehicle shall prevent a parking lamp, taillamp, stoplamp, turn-signal lamp, or backup lamp from meeting its photometric output at any applicable group of test points specified in [Figure 1c] or prevent any other lamp from meeting the photometric output at any test point specified in any applicable SAE Standard or Recommended Practice. However, if motor vehicle equipment (e.g., mirrors, snowplows, wrecker booms, backhoes, and winches) prevents compliance with this paragraph by any required lamp or reflective device, an auxiliary lamp or device meeting the requirements of this paragraph shall be provided.

S4.3.1.1.1. Clearance lamps may be mounted at a location other than on the front and rear if necessary to indicate the overall width of a vehicle, or for protection from damage during normal operation of the vehicle, and at such a location they need not be visible at 45 degrees inboard.

S4.3.1.2. On a truck tractor, the red rear reflex reflectors may be mounted on the back of the cab, at a minimum height not less than 4 inches above the height of the rear tires.

S4.3.1.3. On a trailer, the amber front side reflex reflectors and amber front side-marker lamps may be located as far forward as practicable exclusive of the trailer tongue.

S4.3.1.4. When the rear identification lamps are mounted at the extreme height of a vehicle, rear clearance lamps need not meet the requirement of Table II that they be located as close as practicable to the top of the vehicle.

S4.3.1.5. The center of the lens referred to in SAE Standard J593c, "Backup Lamps," February 1968, is the optical center.

S4.3.1.6 On a truck tractor, clearance lamps mounted on the cab may be located to indicate the width of the cab, rather than the overall width of the vehicle.

S4.3.1.7 The requirement that there be not less than 4 inches between a front turn-signal lamp and a low-beam headlamp, specified in SAE Standard J588e, "Turn Signal Lamps," September 1970, shall not apply if the sum of the candlepower values of the turn-signal lamp measured at the test points within each group listed in [Figure 1c] is not less than two and one-half times the sum specified for each group for yellow turn-signal lamps.

S4.3.1.8 Each high-mounted stoplamp on a passenger car manufactured on or after September

1, 1985, shall be mounted with its center on the vertical centerline of the passenger car as the car is viewed from the rear. The lamp may be mounted at any position on the centerline, including the glazing. If the lamp is mounted inside the vehicle, means shall be provided to minimize reflections from the light of the lamp upon the rear window glazing that might be visible to the driver when viewed directly, or indirectly in the rearview mirror. If the lamp is mounted below the rear window, no portion of the lens shall be lower than 6 inches below the rear window on convertibles, or 3 inches on other passenger cars.

S4.4. Equipment combinations.

S4.4.1. Two or more lamps, reflective devices, or items of associated equipment may be combined if the requirements for each lamp, reflective device, and item of associated equipment are met, except that no clearance lamp may be combined optically with any taillamp or identification lamp, and no high-mounted stoplamp shall be combined with any other lamp or reflective device.

S4.5. Special wiring requirements.

S4.5.1. Each vehicle shall have a means of switching between lower and upper headlamp beams that conforms to SAE Recommended Practice J564a, "Headlamp Beam Switching," April 1964, or to SAE Recommended Practice J565b, "Semi-Automatic Headlamp Beam Switching Devices," February 1969.

S4.5.2. Each vehicle shall have a means for indicating to the driver when the upper beams of the headlamps are on that conforms to SAE Recommended Practice J564a, April 1964, except that the signal color need not be red.

S4.5.3 The taillamps on each vehicle shall be activated when the headlamps are activated in a steady-burning state.

S4.5.4 The stoplamps on each vehicle shall be activated upon application of the service brakes. The high-mounted stoplamp on each passenger car shall be activated only upon application of the service brakes.

S4.5.5. The vehicular-hazard warning-signal operating unit on each vehicle shall operate independently of the ignition or equivalent switch, and when activated, shall cause to flash simultaneously sufficient turn-signal lamps to meet, as a minimum, the turn-signal lamp photometric requirements of this standard.

S4.5.6. Each vehicle equipped with a turn-signal operating unit shall also have an illuminated pilot indicator. Failure of one or more turn-signal lamps to operate shall be indicated in accordance with SAE

Standard J588e, "Turn Signal Lamps," September 1970, except where a variable-load turn-signal flasher is used on a truck, bus, or multipurpose passenger vehicle 80 or more inches in overall width, on a truck that is capable of accommodating a slide-in camper, or on any vehicle equipped to tow trailers.

S4.5.7. On all passenger cars, and motorcycles, and multipurpose passenger vehicles, trucks, and buses of less than 80 inches overall width:

(a) When the parking lamps are activated, the taillamps, license plate lamps, and side-marker lamps shall also be activated; and

(b) When the headlamps are activated in a steady-burning state, the taillamps, parking lamps, license-plate lamps and side marker lamps shall also be activated.

S4.6. When activated:

(a) Turn-signal lamps, hazard warning-signal lamps, and schoolbus warning lamps shall flash;

(b) High-mounted stop lamps on passenger cars manufactured on or after August 1, 1984, but before September 1, 1986, may flash when the hazard warning system is activated; and

(c) All other lamps shall be steady-burning, except that means may be provided to flash headlamps and side-marker lamps for signaling purposes.

S4.7 Replacement equipment

S4.7.1. Each lamp, reflective device, or item of associated equipment manufactured to replace any lamp, reflective device, or item of associated equipment on any vehicle to which this standard applies, shall be designed to conform with this standard.

S4.7.2 Each lamp, reflective device, or item of associated equipment to which section S4.7.1 applies may be labeled with the symbol DOT, which shall constitute a certification that it conforms to applicable Federal motor vehicle safety standards.

S5. Subreferenced SAE Standards and Recommended Practices.

S5.1 SAE Standards and Recommended Practices subreferenced by the SAE Standards and Recommended Practices included in Tables I and III and paragraphs S4.1.4 and S4.5.1 are those published in the 1970 edition of the SAE Handbook, except that the SAE standard referred to as "J575" is J575e, *Tests for Motor Vehicle Lighting Devices and Components*, August 1970, [for stoplamps, taillamps, and turn-signal lamps designed to conform to SAE Standards J586c, J585d/J585e, and J588e, respectively, and for high-mounted stoplamps designed to conform to SAE Recommended Practice J186a.

The reference in J585e to J245 does not apply. The subreferenced Standards and Recommended Practices for headlamps designed to conform to SAE Standard J579c, "Sealed Beam Headlamp Units," December 1974, are those published in the 1977 edition of the SAE Handbook.

| Test Points | | Red (cd) |
|-----------------|------|----------|
| 10U | 10L | 8 |
| | V | 16 |
| | 10R | 8 |
| 5U and 5D | 10L | 16 |
| | 5L | 25 |
| | V | 25 |
| | 5R | 25 |
| | 10R | 16 |
| H | 10L | 16 |
| | 5L | 25 |
| | V | 25 |
| | 5R | 25 |
| | 10R | 16 |
| Maximum | 160* | |

Figure 10—Minimum design photometric requirements for center high-mounted stoplamps

* The lamp shall not exceed the listed maximum over an area larger than that generated by a quarter degree radius within a solid cone angle from 10L to 10R and from 10U to 5D. (49 F.R. 20818—May 17, 1984. Effective: September 1, 1985)]

S5.2 Requirements of SAE Standards incorporated by reference in this standard, other than J576b and J576c, do not include tests for warpage of devices with plastic lenses.

S6. Tests and procedures for replaceable-bulb headlamps. When tested according to the procedures below, each replaceable-bulb headlamp shall meet the requirements of S4.1.1.36.(b) and (d).

S6.1. Photometry. A headlamp shall be tested according to Section S3.5, Photometric Design Requirements of SAE Standard J579c, "Sealed Beam Headlamp Units for Motor Vehicles," December 1978, after the tests specified in S6.2, S6.4, S6.6, S6.7(a), S6.7(b) and S6.8.

S6.2. Abrasion. (a) A headlamp shall be mounted in the abrasion-test fixture in the manner indicated in Figure 5 with the lens facing upward.

(b) An abrading pad meeting the requirements in paragraph (c) (1) through (c) (4) of this section shall be cycled back and forth (1 cycle) for 11 cycles at 4 ± 0.8 in. ($10 \text{ cm} \pm 2 \text{ cm}$) per second over at least 80 percent of the lens surface, including all the area between the upper and lower aiming pads, but not including lens covers and edges.

(c) (1) The abrading pad shall be not less than $1.0 \pm .04$ in. ($2.5 \text{ cm} \pm .1 \text{ cm}$) wide, constructed of 0000 steel wool, and rubber cemented to a rigid base shaped to the same vertical contour of the lens. The "grain" of the pad shall be perpendicular to the direction of motion.

(2) The abrading-pad support shall be equal in size to the pad and the center of the support surface shall be within $\pm .08$ in. ($\pm 2 \text{ mm}$) of parallel to the lens surface.

(3) The density of the abrading pad shall be such that when the pad is mounted to its support and is resting unweighted on the lens, the base of the pad shall be no closer than .125 in. (3.2 mm) to the lens at its closest point.

(4) When mounted on its support and resting on the lens of the test headlamp, the abrading pad shall then be weighted such that a pad pressure of $2.0 \pm .15$ psi ($14 \pm 1 \text{ KPa}$) exists at the center and perpendicular to the face of the lens.

(d) A pivot shall be used if it is required to follow the contour of the lens.

(e) Unused steel wool shall be used for each test.

S6.3. Vibration. A vibration test shall be conducted according to the procedures in SAE Standard J575e, "Tests for Motor Vehicle Lighting Devices and Components," August 1970, and those set forth in paragraphs (a) through (c) of this section.

(a) The table on the adapter plate is of sufficient size to contain completely the test-fixture base with no overhang.

(b) The direction of vibration is the vertical axis of the headlamp as mounted on the vehicle.

(c) The filament is cold (not energized).

S6.4 Chemical resistance. (a) The entire exterior lens surface of the fixtured headlamp and top surface of the lens-reflector joint shall be wiped once to the left and once to the right with a 6-inch-square soft cotton cloth (with pressure equally applied) which has been saturated once in a container with 2 ounces of one of the test fluids listed in paragraph (b) of this section. The lamp shall be wiped within 5 seconds after removal of the cloth from the test fluid.

(b) The test fluids are:

- (1) gasoline—unleaded 89 octane $\frac{(R+M)}{2}$ or

above used per OSHA Std. 29 CFR 1910-106—Handling Storage and Use of Flammable Combustible Liquids.

- (2) tar remover (petroleum base with Xylene).
(3) power steering fluid.

(4) windshield washer fluid consisting of 0.5% monoethanolamine with the remainder 50% concentrations of methanol/distilled water by volume.

(5) antifreeze (50% concentration of ethylene glycol/distilled water by volume).

(c) After the headlamp has been wiped with the test fluid, it shall be stored in designed operating attitude for 48 hours at a temperature of $73^{\circ}\text{F} \pm 7^{\circ}$ ($23^{\circ}\text{C} \pm 4^{\circ}$) and a relative humidity of 30 ± 10 percent. At the end of the 48-hour period, the headlamp shall be wiped clean with a soft dry cotton cloth and visually inspected.

S6.5. Corrosion. (a) A connector test shall be performed on each filament circuit prior to the test in subparagraph (b) according to Figure 1 of SAE Standard J580, August 1979. The power source shall be set to provide 12.8 volts and the resistance shall be set to produce 10 amperes.

(b) The headlamp with connector attached to the terminals, unfixtured and in its designed operating attitude with all drain holes, breathing devices or other designed openings in their normal operating positions, shall be subjected to a salt spray (fog) test in accordance with ASTM B117-73, "Method of Salt Spray (FOG) Testing," for a period of a 240 hours, consisting of 10 successive 24-hour intervals. During each interval, the headlamp shall be mounted in the middle of the chamber and exposed for 23 hours to the salt spray. The spray shall not be activated for the 24th hour. The bulb shall be removed from the headlamp and from the test chamber during the one hour of salt spray deactivation and reinserted for the start of the next test cycle, at the end of the first and last three 23-hour periods of salt spray exposure, and at the end of any two of the fourth through seventh 23 hour periods of salt-spray exposure. The test chamber shall be closed at all times except for a maximum of two minutes which is allowed for removal or replacement of a bulb during each cycle. After the ten cycles, the lens reflector unit without the bulb shall be immersed in deionized water for five minutes, then secured and allowed to dry by natural convection only.

(c) Using the voltage, resistance and pretest setup of subparagraph (a), the current in each filament circuit shall be measured after the test con-

ducted in subparagraph (b). [(49 F.R. 47396—December 4, 1984. Effective: September 1, 1985)]

S6.6 Dust. The headlamp, mounted on a test fixture, with all drain holes, breathing devices or other designed openings in their normal operating positions, shall be positioned within a cubical box, with inside measurements of 35.4 in. (900 mm) on each side, or larger if required for adequate wall clearance, i.e., a distance of at least 5.9 in. (150 mm) between the headlamp and any wall of the box. The box shall contain 9.9 lb. (4.5 kg) of fine powdered cement which conforms to the ASTM C150-77 specification for portland cement. Every 15 minutes, the cement shall be agitated by compressed air or fan blower(s) by projecting blades of air for a 2-second period in a downward direction so that the cement is diffused as uniformly as possible throughout the entire box. This test shall be continued for 5 hours, after which the exterior surfaces of the headlamp shall be wiped clean.

S6.7. Temperature and internal heat tests.

S6.7.1. Temperature cycle. A headlamp mounted on a headlamp test fixture, shall be exposed to 10 complete consecutive thermal cycles having the thermal-cycle profile shown in Figure 6. During the hot cycle, the highest wattage filament in the headlamp shall be energized at design voltage commencing at point "A" of Figure 6 and de-energized at Point "B". Separate or single test chambers may be used to generate the temperature environment described by the thermal-cycle profile. All drain holes, breathing devices, or other designed openings of the headlamp shall be in their normal operating positions.

S6.7.2 Internal heat.

(a) After its lens surface has been cleared, the photometric output on upper beam of a headlamp that has been tested according to S6.7.1 is measured.

(b) The lens surface of the headlamp that would normally be exposed to road dirt shall be sprayed uniformly with any appropriate mixture of dust and water or other material to reduce the photometric output at the test point H-V of the lamp to $25\% \pm 2\%$ of the output originally measured in the high-beam photometric test under paragraph (b) of S4.1.1.36. Such rotation shall be determined under the same conditions under which the original measurement was made.

(c) After the determination has been made that the photometric output of the lamp has been reduced as specified in S6.7.2, the lamp and its mounting hardware shall be mounted in an environmental test chamber in the manner similar to that indicated in Figure 7 "Dirt-Ambient Test Setup." The headlamp shall be soaked for 1 hour at

a temperature of 95°F (35°C) and then [its highest wattage filament shall be energized for 1 hour in a still-air condition, allowing the temperature to rise from 95°F (35°C). (48 F.R. 44815—September 30, 1983. Effective: September 30, 1983)]

(d) The lamp shall be returned to the room ambient temperature, $73 \pm 7^\circ\text{F}$ ($23 \pm 4^\circ\text{C}$) and relative humidity of $30 \pm 10\%$. The lens shall then be cleaned. Photometric output of the lamp on high beam shall be determined according to S6.1.

S6.8. Humidity. (a) The headlamp, mounted on a test fixture, shall be placed in a controlled environment consisting of a temperature of $100^\circ\text{F} \pm 9^\circ$ ($38^\circ\text{C} \pm 5^\circ$) with a relative humidity of $90\% \pm 10\%$. All drain holes, breathing devices, and other designed openings shall be in their normal operating positions. The headlamp shall be subjected to 20 consecutive 6-hour test cycles. In each cycle, it shall be energized at design voltage on the highest wattage filament contained in the device for 1 hour and then deenergized for 5 hours. After completion of the last cycle, the lamp shall be soaked for 1 hour at 73°F (20°C) and a relative humidity of $30\% \pm 10\%$ before it is removed for photometric testing. The headlamp shall be tested for photometrics at 10 ± 1 minutes following completion of the humidity test.

S6.9. Impact. The headlamp shall be rigidly mounted in a headlamp test fixture on the seating lugs with the mechanical axis (bulb/socket axis) vertical, and the lens upward. The seating plane of the test fixture shall consist of oak wood 0.5 inch (13 mm) thick. One impact shall be delivered to the center of the lens on the mechanical axis, using a steel ball bearing with a diameter of .9055 in. (23 mm) weighing 1.76 oz. (50 gm), dropped freely from a distance of 15.75 in. (40 cm) from the bottom of the ball to the surface of the lens, at the intersection of the ball trajectory and the mechanical axis of the headlamp.

S7. Deflection test for replaceable bulb. Each replaceable bulb shall meet the requirements of S4.1.1.38.(b) (6) when tested in the following manner. With the bulb rigidly mounted in a fixture in a manner indicated in Figure 8, apply a force of 4.0 ± 0.1 lb. ($17.8 \pm 4\text{N}$) perpendicular to the longitudinal axis of the glass envelope and perpendicular to, and in a line intersecting, the lateral axis of the low-beam filament. The force shall be applied to the outside surface of the glass envelope using a rod with a hard rubber tip with a minimum spherical radius of .039 in. (1 mm).

S8. [Mechanical aiming fixed adapters for replaceable-bulb headlamps. Each motor vehicle manufactured on or after July 1, 1983, and before July 1, 1984, which is originally equipped with a replaceable-bulb headlamp system, shall be fur-

nished with a pair of fixed headlight aiming adapters for mechanical aimers. Each fixed adapter shall be provided with a lens-to-suction-cup interface that allows the headlamp to be usable with a mechanical aimer. Each adapter, when mounted on the headlamp in contact with the aiming pads prescribed by S4.1.1.36.(a) (2), shall provide a surface perpendicular to the longitudinal axis of the vehicle so that the lamp may be mechanically aimed by a mechanical aimer conforming to SAE Standard J602, October 1980, "Headlamps Aiming Device for Mechanically Aimable Sealed Beam Headlamp Units." (48 F.R. 44815—September 30, 1983. Effective: September 30, 1983)]

Interpretation

(1) The term "overall width" refers to the nominal design dimension of the widest part of the vehicle, exclusive of signal lamps, marker lamps, outside rearview mirrors, flexible fender extensions, and mudflaps, determined with doors and windows closed, and the wheels in the straight-ahead position.

(2) Paragraph S3.1 and Tables I and III of § 571.108 as amended (32 F.R. 18033, December 16, 1967), specify that certain lamp assemblies shall conform to applicable SAE Standards. Each of these basically referenced standards subreferences both SAE Standard J575 (tests for motor-vehicle lighting devices and components), which in turn references SAE Standard J573 on bulbs, and SAE Standard J567 on bulb sockets.

(3) Paragraph C of SAE Standard J575 states in part: "Where special bulbs are specified, they should be submitted with the devices and the same or similar bulbs used in the tests and operated at their rated mean spherical candlepower." The Administrator has determined that this provision of SAE Standard J575 permits the use of special bulbs, including tubular-type bulbs, which do not conform to the detailed requirements of Table I of SAE Standard J573. It follows that the sockets for special bulbs need not conform to the detailed requirements of SAE Standard J567. These provisions for special bulbs in no way exempt the lamp assemblies from meeting all performance requirements specified in Federal Standard No. 108, including those specified in the basically referenced SAE Standards, and in the subreferenced SAE Standard J575.

35 F.R. 16842
October 31, 1970

**TABLE I.—REQUIRED MOTOR VEHICLE LIGHTING EQUIPMENT—
MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 OR MORE INCHES
OVERALL WIDTH**

| Item Column 1 | Multipurpose passenger vehicles, trucks and buses Column 2 | Trailers Column 3 | Applicable SAE standards or recommended practice Column 4 |
|---|---|----------------------|---|
| Headlamps | 2 white 7-inch Type 2 headlamp units; or 2 white 5¾-inch Type 1 headlamp units and 2 white 5¾-inch Type 2 headlamp units; or 2 white Type 2A headlamp units and 2 white Type 1A headlamp units. 2 white headlamps: Type 2B1 or Type 2D1; or 4 white headlamps: 2 each Type 1C1 and Type 2C1, or Type 1A1 and Type 2A1. | None | J580a, June 1966; J579a, August 1965, J571d, June 1976 and J566, January 1960. J580b, February 1974; J579c, December 1974; J571d, June 1976; J1132, January 1976 |
| Taillamps ² | 2 red | 2 red | J585e, September 1977 |
| Stoplamps ² | 2 red | 2 red | J586c, August 1970 |
| License-plate lamp ¹ | 1 white | 1 white | J587, October 1981 |
| Reflex reflectors | 4 red; 2 amber | 4 red; 2 amber | J594f, January 1977 |
| Side-marker lamps | 4 red; 2 amber | 2 red; 2 amber | J592e, July 1972 |
| Backup lamp ¹ | 1 white | None | J593c, February 1968 |
| Turn-signal lamps ² | 2 red or amber; 2 amber | 2 red or amber. | J588e, September 1970 |
| Turn signal operating unit. ³ | 1 | None | J589, April 1964 |
| Turn-signal flasher | 1 | None | J590b, October 1965 |
| Vehicular hazard-warning signal operating unit | 1 | None | J910, January 1966 |
| Vehicular hazard warning signal flasher | 1 | None | J945, February 1966 |
| Identification lamps | 3 amber; 3 red | 3 red | J592e, July 1972 |
| Clearance lamps | 2 amber; 2 red | 2 amber; 2 red | J592e, July 1972 |
| Intermediate side-marker lamps. ⁴ | 2 amber | 2 amber | J592e, July 1972 |
| Intermediate side reflex reflectors ⁴ | 2 amber | 2 amber | J594f, January 1977 |

¹ See S4.1.1.10.

² See S4.1.1.11-12.

³ See S4.5.6.

⁴ See S4.1.1.3.

**TABLE II.—LOCATION OF REQUIRED MOTOR VEHICLE LIGHTING EQUIPMENT
MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 OR MORE INCHES
OVERALL WIDTH**

| Item Column 1 | Location on— | | Height above road surface measured from center of item on vehicle at curb weight Column 4 |
|-------------------------------------|--|---|---|
| | Multipurpose passenger vehicles, trucks, and buses Column 2 | Trailers Column 3 | |
| Headlamps_____ | On the front, each type at the same height, 1 on each side of the vertical centerline; as far apart as practicable | Not required _____ | Not less than 22 inches (55.9 cm) nor more than 54 inches (137.2 cm) |
| Taillamps_____ | On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable | On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable | Not less than 15 inches, nor more than 72 inches |
| Stoplamps_____ | On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable | On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable | Not less than 15 inches, nor more than 72 inches |
| License-plate lamp. | At rear license plate, to illuminate the plate from the top or sides | At rear license plate to illuminate the plate from the top or sides | No requirement |
| Backup lamp _____ | On the rear _____ | Not required _____ | No requirement |
| Turn-signal lamps. | At or near the front—1 amber on each side of the vertical centerline, at the same height, and as far apart as practicable. On the rear—1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable | On the rear—1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable | (Not less than 15 inches, nor more than 83 inches) |
| Identification lamps | (On the front and rear—3 lamps, amber in front, red in rear, as close as practicable to the top of the vehicle, at the same height, as close as practicable to the vertical centerline, with lamp centers spaced not less than 6 inches or more than 12 inches apart.) | (On the rear—3 lamps as close as practicable to the top of the vehicle at the same height, as close as practicable to the vertical centerline, with lamp centers spaced not less than 6 inches or more than 12 inches apart.) | On the front only— No part of the lamp or mountings shall extend below the top of the vehicle's windshield |
| Clearance lamps | On the front and rear—2 amber lamps on front, 2 red lamps on rear, to indicate the overall width of the vehicle, one on each side of the vertical centerline, at the same height, and as near the top as practicable | On the front and rear—2 amber lamps on front, 2 red lamps on rear, to indicate the overall width of the vehicle, one on each side of the vertical centerline, at the same height, and as near the top thereof as practicable | No requirement |
| Intermediate side marker lamps | On each side—1 amber lamp located at or near the midpoint between the front and rear side-marker lamps | On each side—1 amber lamp located at or near the midpoint between the front and rear side marker lamps | Not less than 15 inches |
| Intermediate side reflex reflectors | On each side—1 amber located at or near the midpoint between the front and rear side reflex reflectors | On each side—1 amber located at or near the midpoint between the front and rear side reflex reflectors | Not less than 15 inches nor more than 60 inches |
| Reflex reflectors | On the rear—1 red on each side of the vertical centerline, as far apart as practicable, and at the same height On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable | On the rear—1 red on each side of the vertical centerline, as far apart as practicable, and at the same height On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable | Not less than 15 inches nor more than 60 inches |
| Side marker lamps | On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable | On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable | Not less than 15 inches, and on the rear of trailers not more than 60 inches |

* (49 F.R. 46386—November 26, 1984 Effective: December 26, 1984)

**TABLE III.—REQUIRED MOTOR VEHICLE LIGHTING EQUIPMENT
ALL PASSENGER CARS AND MOTORCYCLES, AND MULTIPURPOSE PASSENGER VEHICLES, TRUCKS,
TRAILERS, AND BUSES, OF LESS THAN 80 INCHES OVERALL WIDTH**

| Item Column 1 | Passenger cars, multi- purpose passenger vehicles, trucks, and buses Column 2 | Trailers Column 3 | Motorcycles Column 4 | Applicable SAE standards or recommended practices Column 5 |
|---|---|----------------------|--------------------------|--|
| Headlamps | 2 white 7-inch Type 2 headlamp units; or 2 white 5¾-inch Type 1 headlamp units or 2 white 5¾-inch Type 2A headlamp units; and 2 white Type 1A headlamp units. | | | J580a, June 1966; J579a, August 1965, J571d, June 1976 and J566, January 1960 |
| | 2 white headlamps: Type 2B1 or Type 2D1; or 4 white headlamps: 2 each Type 1C1 and Type 2C1, or Type 1A1 and Type 2A1 | | 1 white | J580b, February 1974; J579c, December 1974; J571d, June 1976; J1132, January 1976 J584, April 1964 and J566, January 1960 |
| Taillamps ² | 2 red | 2 red | 1 red | J585e, September 1977. |
| Stoplamps ² | 2 red | 2 red | 1 red | J586c, August 1970. |
| High-mounted stoplamp | 1 red, for passenger cars only | Not required | Not required | J186a, September 1977 |
| License-plate lamp ¹ | 1 white | 1 white | 1 white | J587, October 1981. |
| Parking lamps ² | 2 amber or white | None | None | J222, December 1970. |
| Reflex reflectors | 4 red, 4 amber | 4 red; 2 amber | 3 red; 2 amber | J594f, January 1977. |
| Intermediate side reflex reflectors. ⁵ | 2 amber | 2 amber | None | J594f, January 1977. |
| Intermediate side-marker lamps. ⁵ | 2 amber | 2 amber | None | J592c, July 1972. |
| Side-marker lamps | 2 red, 2 amber | 2 red; 2 amber | None | J592e, July 1972. |
| Backup lamp | 1 white | None | None | J593c, February 1968. |
| Turn-signal lamps ³ | 2 red or amber; 2 amber. | 2 red or amber. | 2 amber; 2 red or amber. | J588, September 1970. |
| Turn-signal operating unit. ^{3 4} | 1 | None | 1 | J589, April 1964. |
| Turn-signal flasher | 1 | None | 1 | J590b, October 1965. |
| Vehicular hazard-warning signal operating unit | 1 | None | None | J910, January 1966. |
| Vehicular hazard-warning signal flasher | 1 | None | None | J945, February 1966. |

¹ See S4.1.1.10.

² See S4.1.1.11-12.

³ See S4.5.6.

⁴ See S4.1.1.5.

⁵ See S4.1.1.3.

**TABLE IV.—LOCATION OF REQUIRED EQUIPMENT—
ALL PASSENGER CARS AND MOTORCYCLES, AND MULTIPURPOSE PASSENGER VEHICLES, TRUCKS,
TRAILERS, AND BUSES, OF LESS THAN 80 INCHES OVERALL WIDTH**

| Item Column 1 | Location on | | Height above road surface measured from center of item on vehicle at curb weight Column 4 |
|-------------------------------------|--|--|--|
| | Passenger cars, multipurpose pas- senger vehicles, trucks, trailers, and buses Column 2 | Motorcycles Column 3 | |
| Headlamps | On the front, each type at the same height, 1 on each side of the vertical centerline; as far apart as practicable | On the front, on the vertical centerline, except that if two are used they shall be symmetrically disposed about the vertical centerline | Not less than 22 inches (55.9 cm) nor more than 54 inches (137.2 cm) |
| Taillamps | On the rear—1 on each side of the vertical centerline, at the same height, and as far apart as practicable | On the rear—on the vertical centerline except that if two are used, they shall be symmetrically disposed about the vertical centerline | Not less than 15 inches, nor more than 72 inches |
| Stoplamps | On the rear—1 on each side of the vertical centerline, at the same height, and as far apart as practicable | On the rear—on the vertical centerline except that if two are used, they shall be symmetrically disposed about the vertical centerline | Not less than 15 inches, nor more than 72 inches |
| High-mounted stoplamp | On the rear, on the vertical centerline [see S4.3.1.8], effective September 1, 1985, for passenger cars only (48 F.R. 48325—October 18, 1983. Effective: September 1, 1985)] | Not required | [See S4.3.1.8] |
| License-plate lamp | At rear license plate, to illuminate the plate from the top or sides | At rear license plate | No requirement |
| Parking lamps | On the front—1 on each side of the vertical centerline, at the same height, and as far apart as practicable | Not required | Not less than 15 inches, nor more than 72 inches |
| Reflex reflectors | On the rear—1 red on each side of the vertical centerline, at the same height, and as far apart as practicable On each side—1 red as far to the rear as practicable and 1 amber as far to the front as practicable | On the rear—1 red on the vertical centerline except that if two are used on the rear, they shall be symmetrically disposed about the vertical centerline On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable | Not less than 15 inches nor more than 60 inches |
| Backup lamp | On the rear | Not required | No requirement |
| Turn-signal lamps ¹ | At or near the front—1 amber on each side of the vertical centerline, at the same height, and as far apart as practicable On the rear—1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable | At or near the front—1 amber on each side of the vertical centerline, at the same height, and having a minimum horizontal separation distance (centerline of lamps) of 16 inches; minimum edge-to-edge separation distance between lamp and headlamp is 4 inches At or near the rear—1 red or amber on each side of the vertical centerline, at the same height and having a minimum horizontal separation distance (centerline to centerline of lamps) of 9 inches; minimum edge-to-edge separation distance between lamp and tail or stoplamp is 4 inches | Not less than 15 inches, nor more than 83 inches |
| Side-marker lamps | On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable | Not required | Not less than 15 inches |
| Intermediate side-marker lamps | On each side—1 amber located at or near the midpoint between the front and rear side-marker lamps | Not required | Not less than 15 inches |
| Intermediate side-marker reflectors | On each side—1 amber located at or near the midpoint between the front and rear side marker reflectors | Not required | Not less than 15 inches, nor more than 60 inches |

¹ Front turn-signal lamps not required for trailers.

* (49 F.R. 46386—November 26, 1984 Effective: December 26, 1984)

Specifications for the Standardized Replaceable Light Source

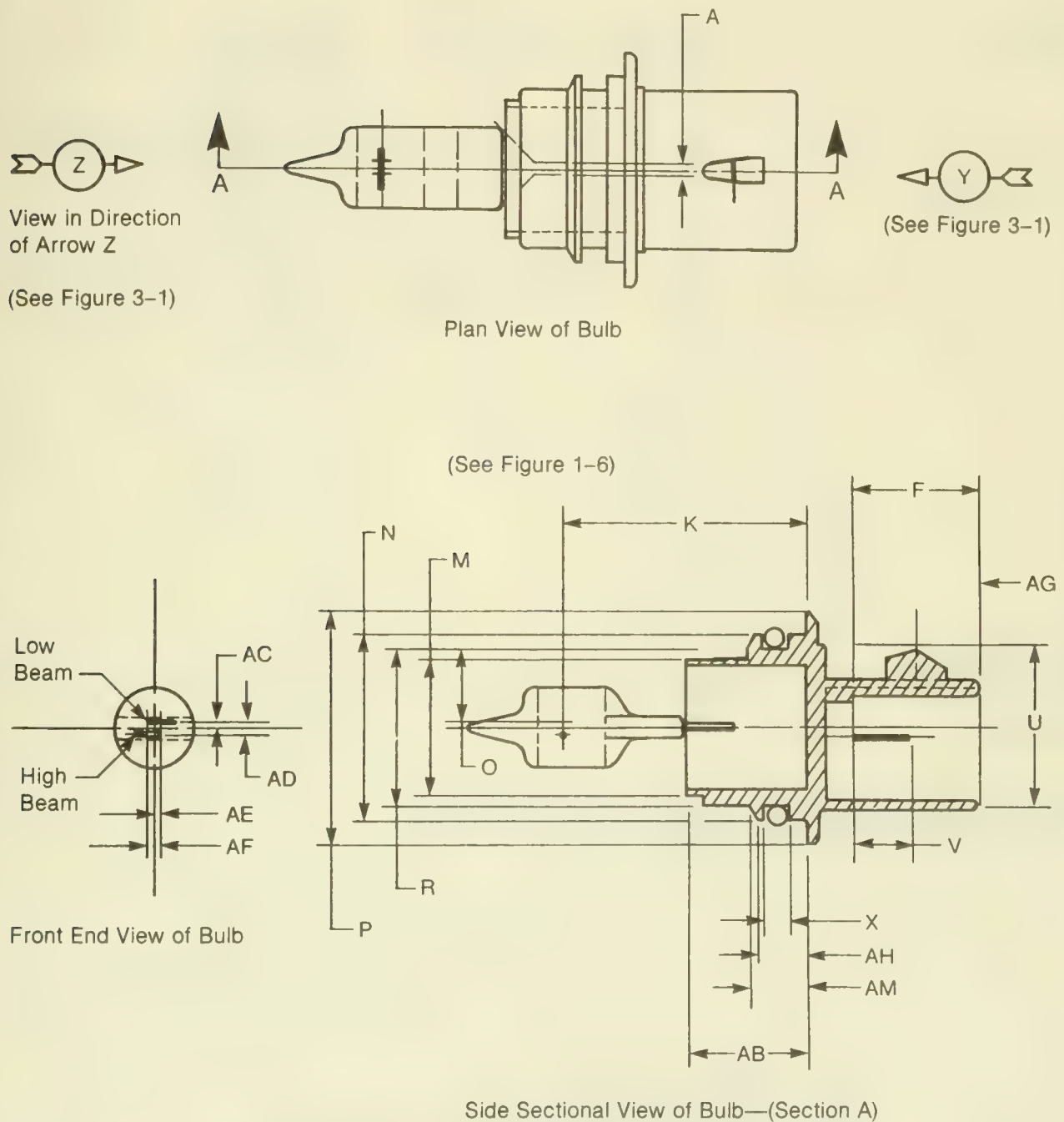


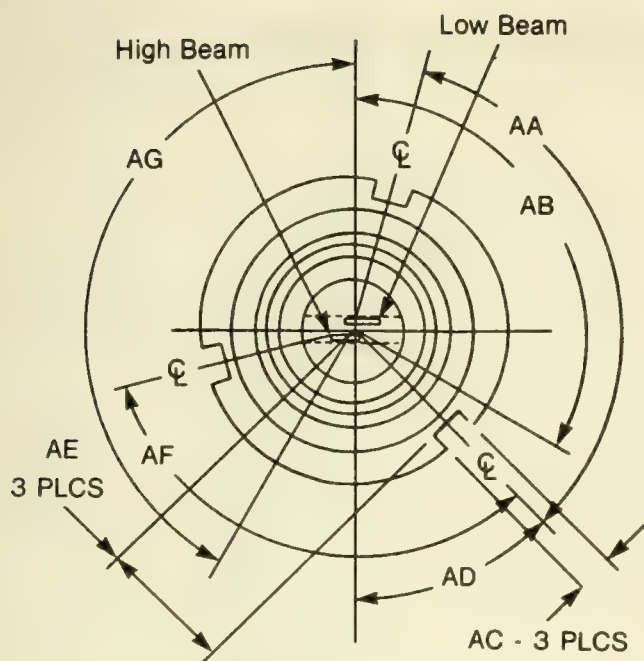
Figure 3. Interchangeability Drawing of Headlamp Bulb Assembly

[Note: Unless otherwise specified, a general tolerance of ± 0.004 in. (0.10 mm) shall apply to all linear dimensions and $\pm 1\%$ shall apply to all angular dimensions specified in Fig. 3. (48 F.R. 44815—September 30, 1983. Effective: September 30, 1983)]

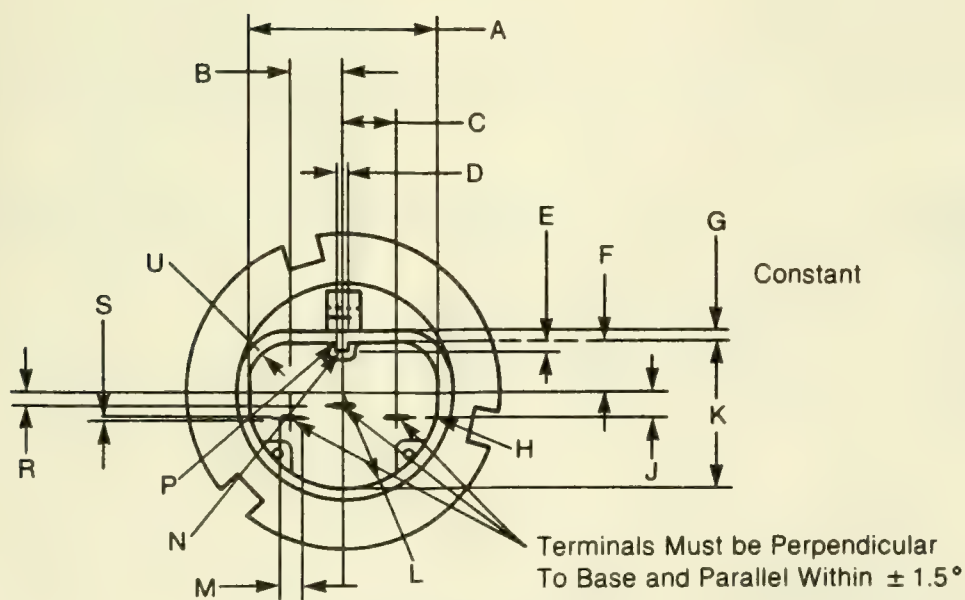
| Dimension | Inches | Millimeters |
|-----------------------------|---|-------------------------------------|
| A | .085 to .083 .002 Either Side CL | 2.15 to 2.10 .05 Either side CL |
| F | .806 | 23.00 |
| K Low Beam | 1.752 \pm .015 within .020 | 44.50 \pm .38 |
| High Beam | 1.752 \pm .035 of position of low beam | 44.50 \pm .90 |
| M | .974 | 24.75 |
| N | (1.335 to 1.331) .CC2 Either side CL | (33.90 to 33.80) .05 Either side CL |
| O To be a Ref Dim. | .517 \pm 0.020 | 13.13 \pm .050 |
| P | 1.673 | 42.50 |
| R | (1.126 to 1.122) .002 Either side CL | (28.60 to 28.50) .05 Either side CL |
| U | 1.181 | 30.00 |
| V | .413 | 10.50 |
| X | .189 | 4.80 |
| AC | .045 \pm .020 | 1.15 \pm .50 |
| AD | .091 \pm .028 | 2.30 \pm .70 |
| AE | .047 \pm .020 | 1.20 \pm .50 |
| AF | .094 \pm .032 | 2.40 \pm .80 |
| AH | .356 | 9.05 |
| AM | .454 | 11.55 |
| Reference Dimensions | | |
| AB | .866 | 22.00 |
| #K High Beam | 1.752 | 44.50 |

[Note: Otherwise specified, a general tolerance of \pm .004 in. (0.10 mm) shall apply to all linear dimensions and \pm 1% shall apply to all angular dimensions specified in Fig. 3. (48 F.R. 44815—September 30, 1983. Effective: September 30, 1983)]

Figure 3 (Continued). Dimensional Specifications



View Z—From Bulb End

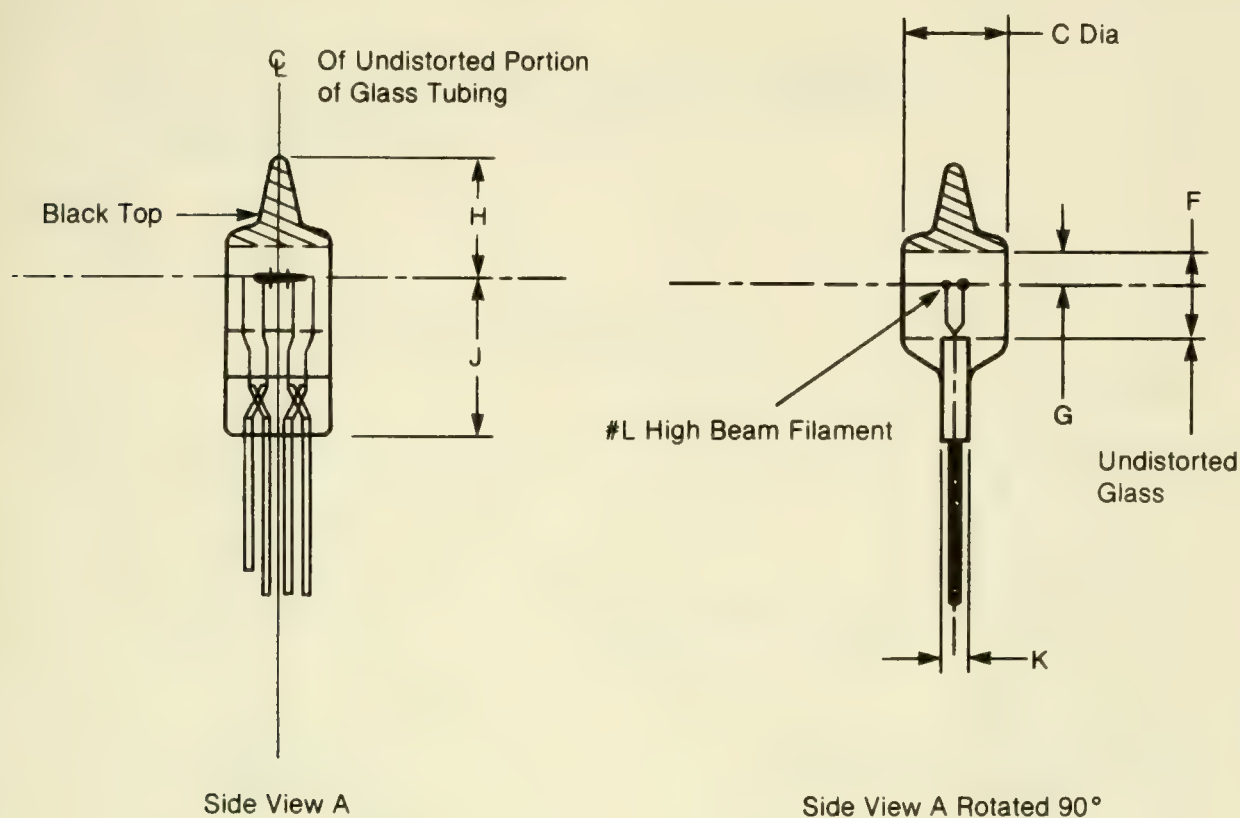


View Y—From Connector End

Figure 3-1. Bulb End and Connector End

| Dimension | Inches | Millimeters |
|-----------|-------------|-------------|
| AA | 120° | 120° |
| AB | 120° | 120° |
| AC | .197 | 5.0 |
| AD | 44° 30° | 44° 30° |
| AE | .722 | 18.35 |
| AF | 120° | 120° |
| AG | 150° | 150° |
| AJ | .138 | 3.50 |
| A | 1.024 | 26.00 |
| B | .289 ± .010 | 7.35 ± .25 |
| C | .289 ± .010 | 7.35 ± .25 |
| D | .055 | 1.40 |
| E | .059 | 1.50 |
| F | .278 | 7.05 |
| G | .059 | 1.50 |
| J | .142 ± .010 | 3.60 ± .25 |
| K | .807 | 20.50 |
| L | .531 R | 13.50 R |
| M | .118 | 3.00 |
| R | .075 ± .010 | 1.90 ± .25 |
| S | .025 ± .002 | .63 ± .25 |
| U | .222 R | 5.65 R |

Figure 3-1 (Continued). Dimensional Specifications



| Dimension | Inches | Millimeters |
|-----------|--|---|
| C | .579 ± .012 | 14.7 ± .50 |
| F | .472 min. undistorted glass | 12.0 min. undistorted glass |
| G | .197 min. (maximum dimension to cover glass distortion line) | 5.0 min. (maximum dimension to cover glass distortion line) |

Figure 3-2. Halogen Capsule

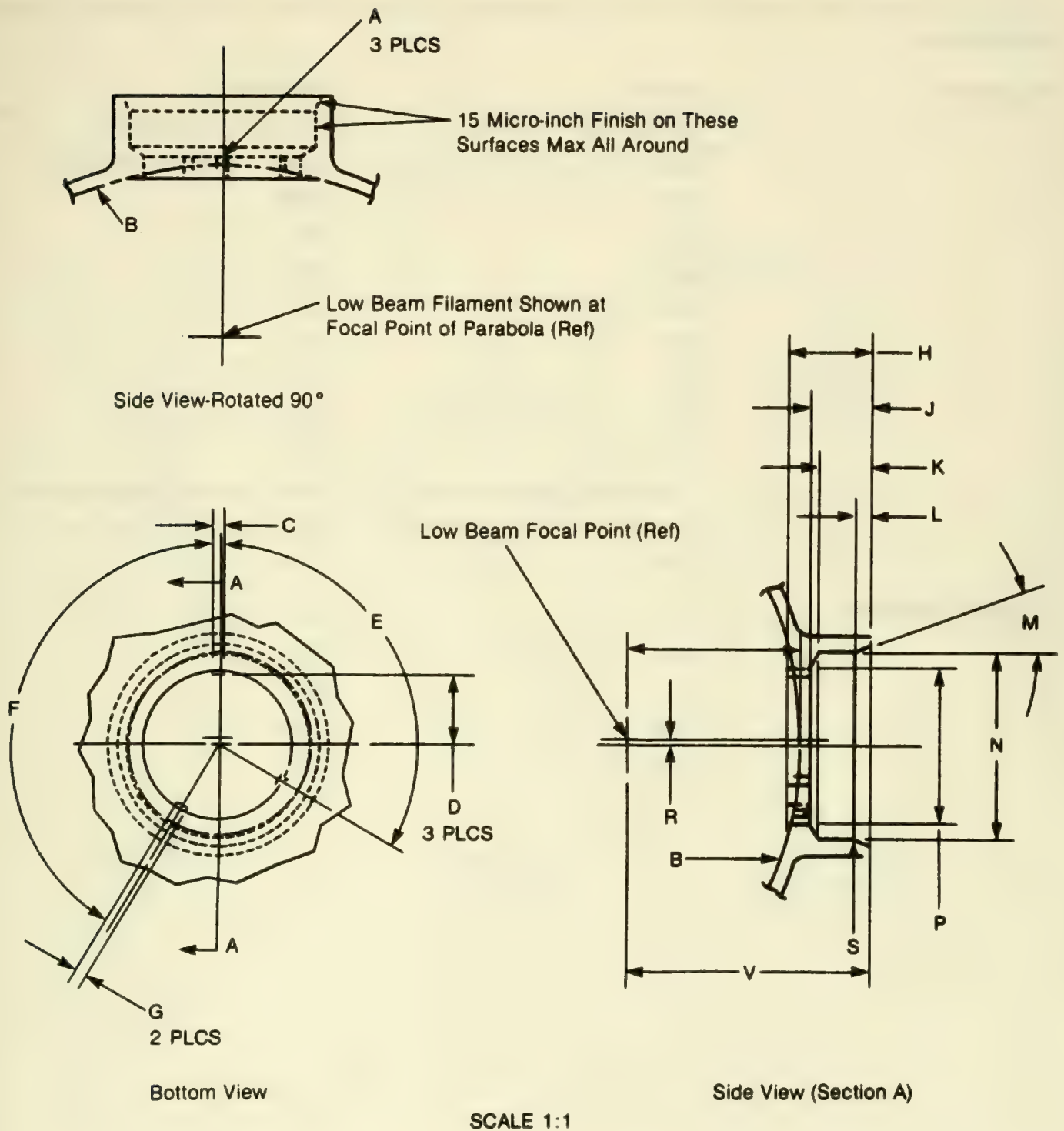


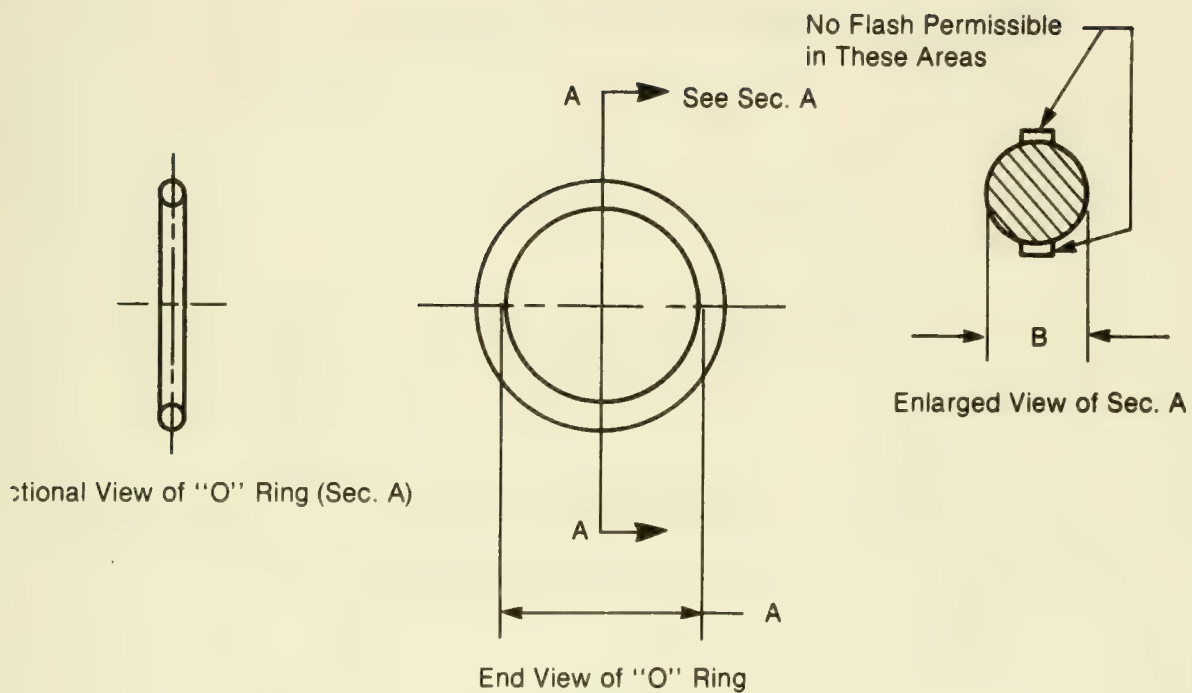
Figure 3-3. Socket (In reflector)

(See reverse page for dimensional specifications)

Specifications

| Dimensional | Inches | Millimeters |
|-----------------------------|---|--|
| B | Ref Line Lamp Parabola | Ref Line Lamp Parabola |
| C | .079 ± .002 + .002 Either side of CL | 2.00 ± .05 .05 Either Side of CL |
| D | .502 | 12.75 |
| E | 120° | 120° |
| F | 150° | 150° |
| G | .079 | 2.00 |
| H | .596 | 15.15 |
| J | .433 | 11.00 |
| K | .374 | 9.50 |
| L | .108 | 2.75 |
| N | (1.350 to 1.346) .002 Either Side of CL | (34.30 to 34.20) .05 Either side of CL |
| P | (1.132 to 1.128) .002 Either side of CL | (28.75 to 28.65) .05 Either side of CL |
| R | .045 | 1.15 |
| Reference Dimensions | | |
| A | .032 R | .8 R |
| M | 20° | 20° |
| U | 1.250 | 31.75 |
| V | 1.752 | 44.50 |

Figure 3-3 (Continued). Dimensional Specifications



Dimensions

A
B

Inches

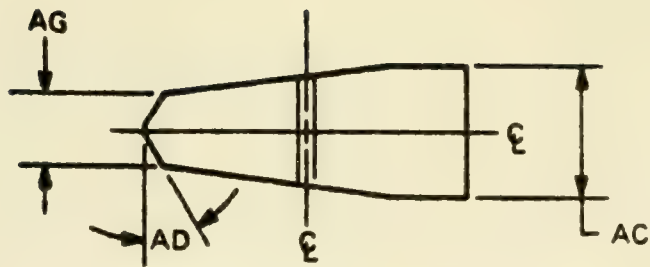
$1.109 \pm .012$
 $.139 \pm .004$

Millimeters

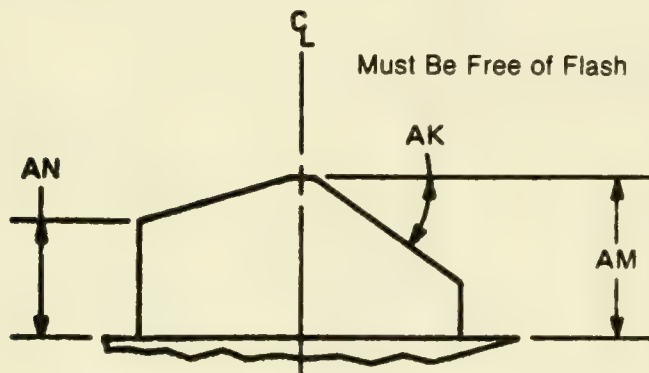
28.17 ± 0.30
 3.53 ± 0.10

Figure 3-4. 'O' Ring

PART 571; S 108-27-28



Exploded View W Four Times Size



Exploded View of Locking Feature

| <i>Letter</i> | <i>Inches</i> | <i>Millimeters</i> |
|---------------|---------------|--------------------|
| AC | .179 | 4.55 |
| AD | 30° | 30° |
| AG | .098 | 2.50 |
| AK | 35° | 35° |
| AM | .217 | 5.50 |
| AN | .157 | 4.00 |

Dimensional Specifications

Figure 3-5. Exploded Views

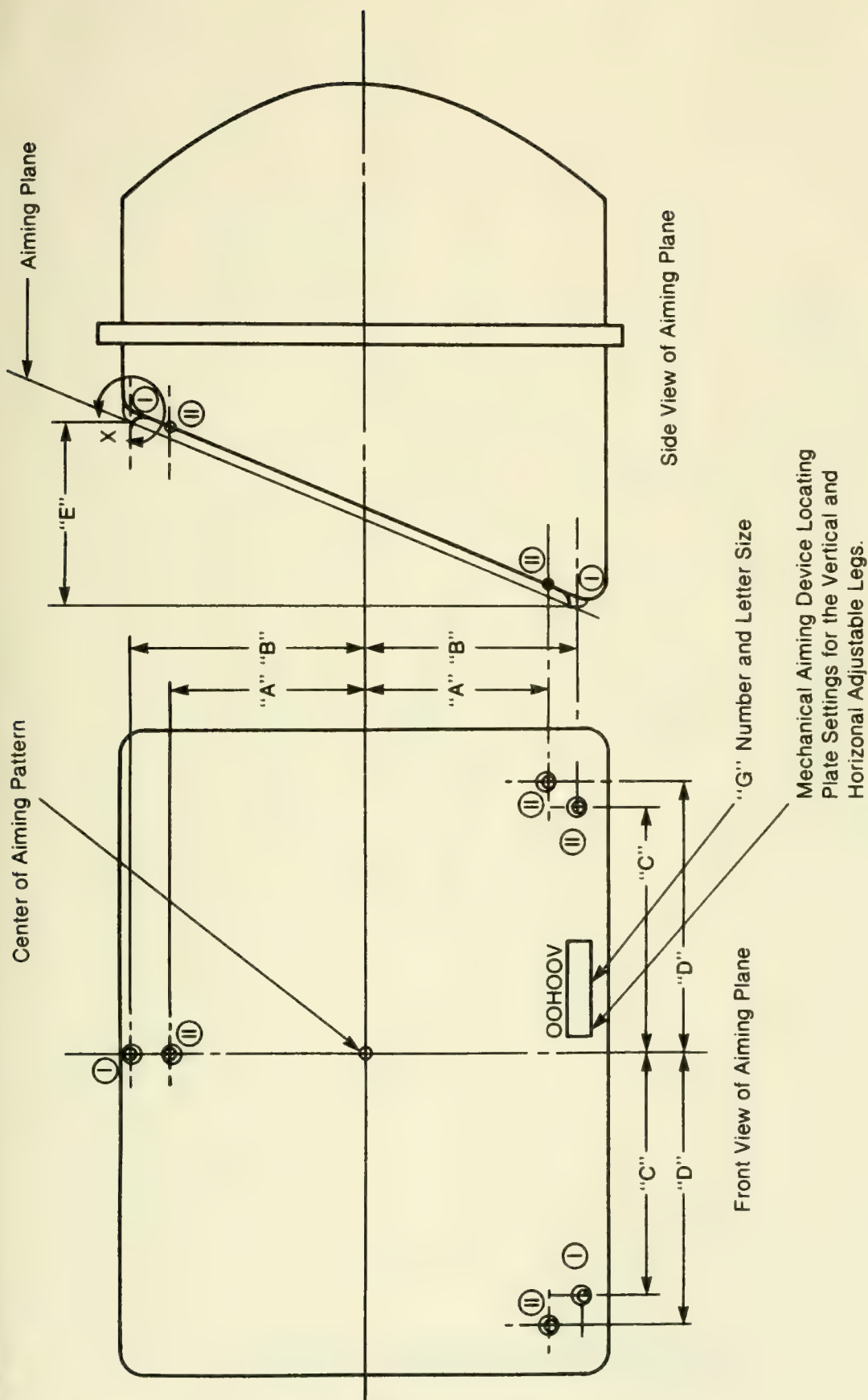


Figure 4. Dimensional Specifications for Location of Aiming Pads on Replaceable Bulb Headlamp Units

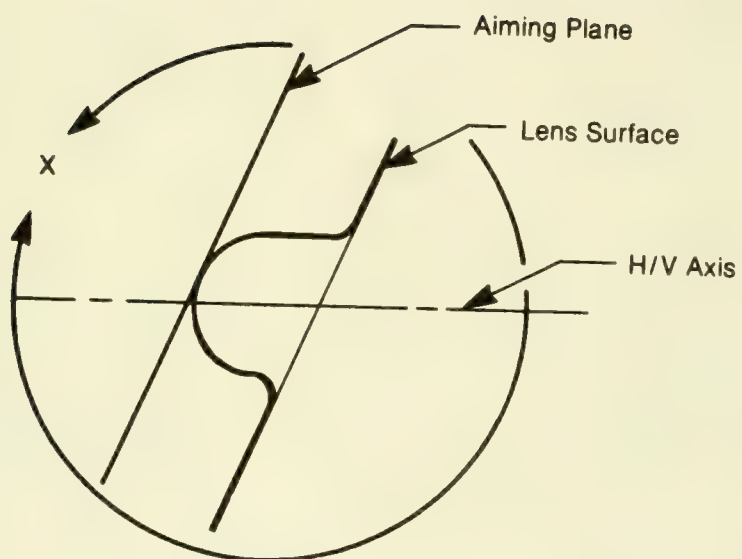


Figure 4-1. Detail Example of Aiming Pad

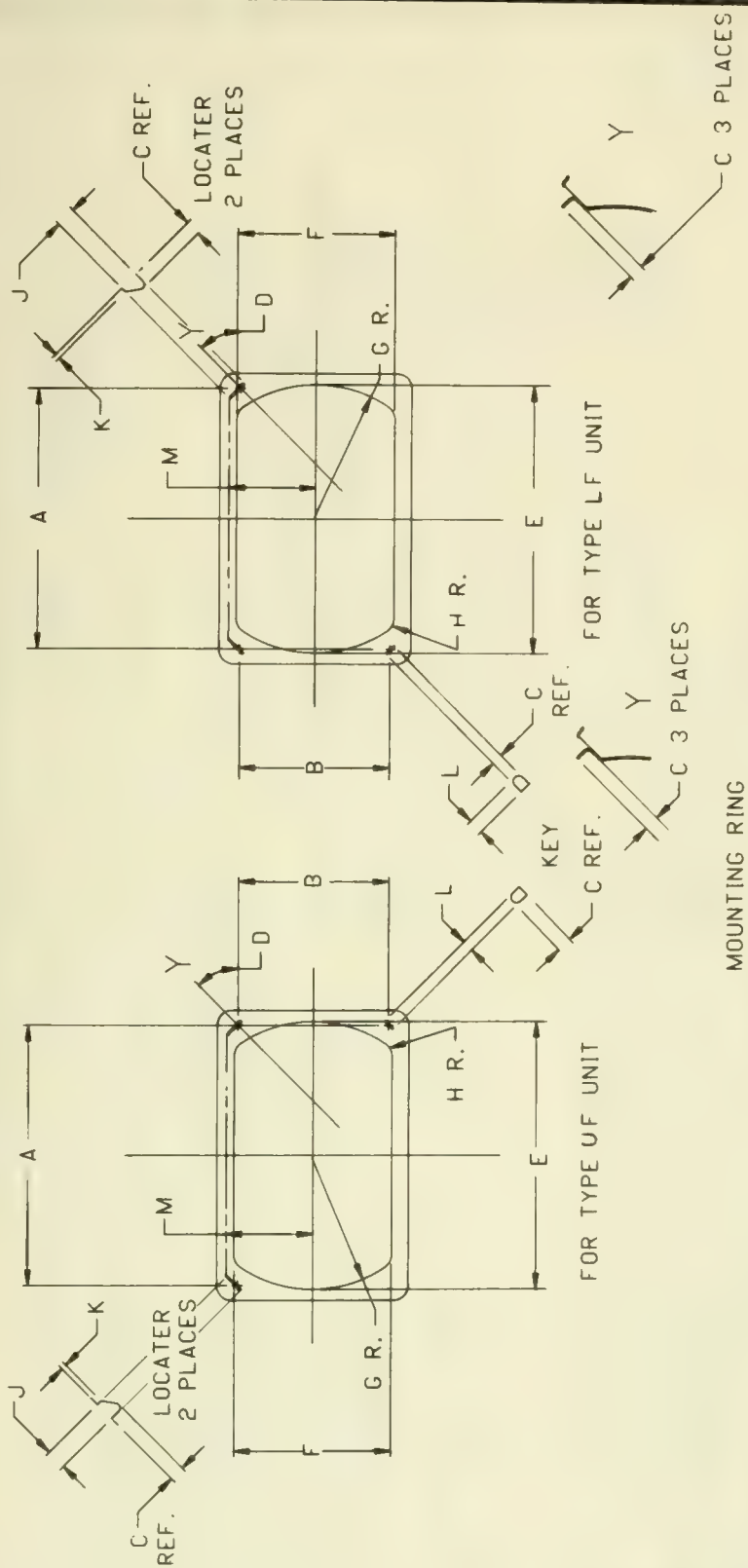


FIG. 13 - FRONT VIEW OF KEYS
OR LOCATORS FOR TYPE LF AND UF
RECTANGULAR SEALED BEAM HEADLAMP
UNIT MOUNTING RINGS

| LETTER | INCH | MM |
|--------|------------------|-------------------|
| A | 5.433 \pm .012 | 138.00 \pm 0.30 |
| B | 3.150 \pm .012 | 80.00 \pm 0.30 |
| C | .315 \pm .02 | 8.0 \pm 0.5 |
| D | 45° 3 PLACES | 45° 3 PLACES |
| E | 5.63 \pm .010 | 143.0 \pm 0.30 |
| F | 3.307 \pm .010 | 84.00 \pm 0.30 |
| G | 2.79 \pm .12 | 71.0 \pm 3.0 |
| H | .32 \pm .04 | 8.0 \pm 1.0 |
| J | .39 \pm .04 | 10.0 \pm 1.0 |
| K | .17 \pm .07 | 4.3 \pm 1.7 |
| L | .24 \pm .04 | 6.0 \pm 1.0 |
| M | 1.823 \pm .013 | 46.30 \pm 0.30 |

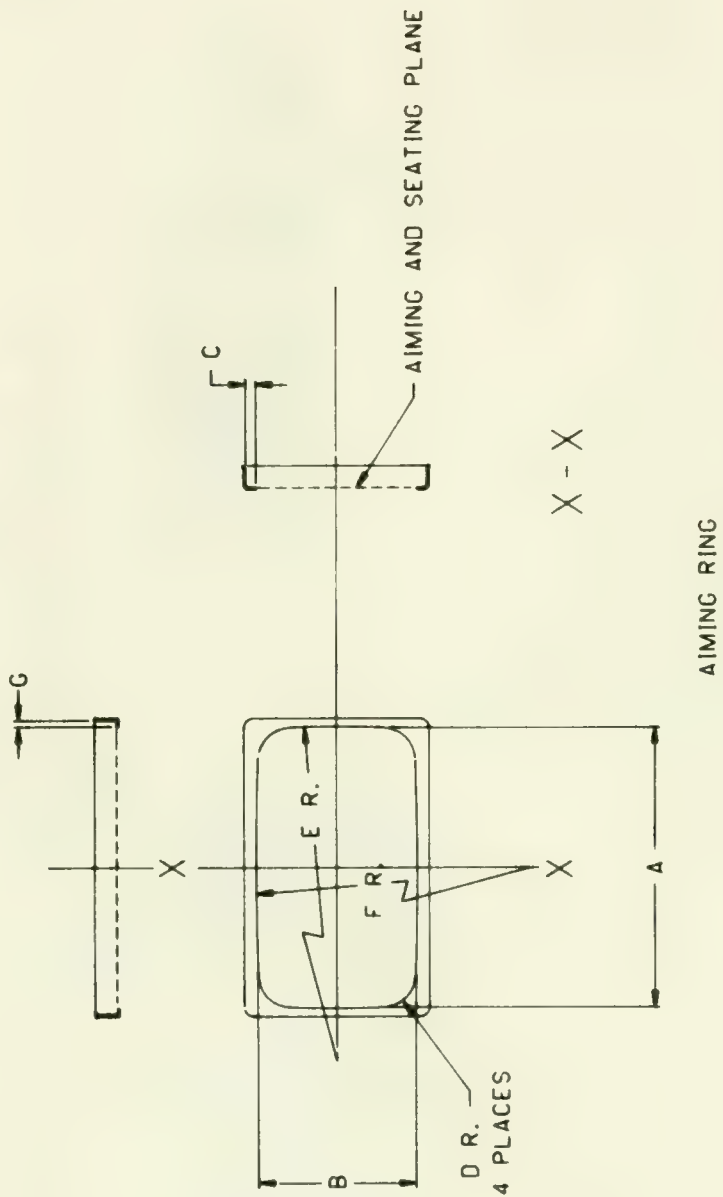


FIG. 14 - AIMING/SEATING RING
FOR TYPE LF AND UF RECTANGULAR SEALED
BEAM HEADLAMP UNITS

| LETTER | INCH | MM |
|--------|--------------|----------------|
| A | 5.721 ± .006 | 145.30 ± 0.30 |
| B | 3.284 ± .006 | 83.40 ± 0.30 |
| C | .213 MIN. | 5.40 MIN. |
| D | .670 MAX. | 17.00 MAX. |
| E | 23.7 ± 2.0 | 602.2 ± 50.0 |
| F | 63.0 ± 3.93 | 1600.0 ± 100.0 |
| G | .134 MIN. | 3.40 MIN. |

PHOTOMETRIC TEST POINT VALUES

| UPPER BEAM | | | LOWER BEAM | | |
|---------------------------------|-------------|-------------|---------------------------------|-------------|-------------|
| Test Points deg ^b | cd. max. | cd. min. | Test Points deg ^b | cd. max. | cd. min. |
| 2U-V | -- | 1,500 | 10U-90U ^a | 125 | -- |
| 1U-3R and 3L | -- | 5,000 | 1U-1-1/2L to L | 700 | -- |
| H-V | 70,000 | 40,000 | 1/2U-1-1/2L to L | 1,000 | -- |
| | | | 1/2D-1-1/2L to L | 3,000 | -- |
| | | | 1-1/2U-1R to R | 1,400 | -- |
| H-3R and 3L | -- | 15,000 | 1/2U-1R to 3R | 2,700 | -- |
| H-6R and 6L | -- | 5,000 | 1/2D-1-1/2R | 20,000 | 10,000 |
| H-9R and 9L | -- | 3,000 | 1D-6L | -- | 1,000 |
| H-12R and 12L | -- | 1,500 | 1-1/2D-2R | -- | 15,000 |
| 1-1/2D-V | -- | 5,000 | 1-1/2D-9L and 9R | -- | 1,000 |
| 1-1/2D-9R and 9L | -- | 2,000 | 2D-15L and 15R | -- | 850 |
| 2-1/2D-V | -- | 2,500 | 4D-4R | 12,500 | -- |
| 2-1/2D-12R and 12L | -- | 1,000 | | | |
| 4D-V | 5,000 | -- | | | |

^aFrom the normally exposed surface of the lens face.

^bA tolerance of $\pm 1/4$ deg in location may be allowed for at any test point.

92 X 150 MM

MACHINE MATERIALS

ALUM - SAE-AA-6061-T6 OR EQUIV

SPRING STEEL SAE 1050 - CADMIUM PLATE

STEEL CADMIUM PLATE

ALUM MACHINE THREADS

MACHINED DIMS. ± 0.12 MM

(1) 5.08 BUBBLE MOVEMENT
MUST INDICATE 0.25°
SENSITIVITY OR BETTER

(2) MUST BE ACCURATE TO
WITHIN ±0.05° THRU
A RANGE OF ±4° —

-10 EQUAL DIVISIONS
1 REVOLUTION EQUALS
0.5° DEFLECTION

ALUMINUM SLEEVE TO LIMIT
THUMB SCREW ADJUSTMENT
TO 4° DOWN

BRASS THUMB
SCREW. 64 PITCH
THREAD

1600 OR
TOP & BOTTOM

20. OR.
TYP —

SPRING CLIP AND GROOVE
IN THUMB SCREW TO LIMIT
ADJUSTMENT TO 4° UP—

LIGHTENING HOLES AS
REQUIRED. FINAL WEIGHT
OF DISC, CLAMP AND
LEVEL ASM. TO BE Q33 KG.

SPOT DRILL AS REQ'D. FINAL WEIGHT
OF EYEBOLT & WEIGHT ASM. TO BE
1.814 KG.

OPTIONAL CONSTRUCTION

DEFLECTOMETER

FIG.-16

PART 571; S 108-54

PREAMBLE TO MOTOR VEHICLE SAFETY STANDARD NO. 109

New Pneumatic Tires—Passenger Cars

(Docket No. 18)

A proposal to amend § 371.21 of Part 371, Initial Federal Motor Vehicle Safety Standards, by adding Standard No. 109, New Pneumatic Tires—Passenger Cars; and Standard No. 110, Tire Selection and Rims—Passenger Cars; was published in the *Federal Register* on July 22, 1967 (32 F.R. 10812).

Interested persons have been afforded an opportunity to participate in the making of the amendment.

Compliance with the labeling requirements of Standard No. 109, established in accordance with section 201 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1421), and the tread wear indicator requirements found in the standard may necessitate the modification of tire molds. Several tire manufacturers requested that additional time be allowed to modify these tire molds. After evaluation of all data received, it was determined that an effective date of August 1, 1968, for paragraphs S4.2.1 and S4.3 would provide a reasonable amount of time to accomplish the necessary mold modifications.

Many comments stated that no practical way is known to permanently affix a label onto the tire sidewall, as would have been required by proposed paragraph S4.3.1 until such time as a label is molded into or onto the tire. Accordingly, S4.3.1 of Standard No. 109 has been modified to permit, until August 1, 1968, the use of a label or tag containing the required labeling information not permanently molded into or onto the tire.

Many comments objected to the limitations imposed by the maximum tire section width dimensions specified in the tables of the notice. The Administrator has determined that additional dimensional latitude is necessary, and therefore Standard No. 109 specifies that to pro-

vide for tire growth, protective side ribs, ornamentation, manufacturing tolerances, and design differences for each tire size designation, actual tire section width and overall tire width may exceed the section width specified in Table I of the Standard by 7 percent.

In response to requests, additional tire size designations and load/inflation schedules were added when necessary information was available. In addition, Table I of Standard No. 109 and Table II of Standard No. 110 have been combined to collate related information.

Persons desiring an amendment to Standard No. 109 adding tires not presently listed, should submit sufficient pertinent information relative to these tires in 10 copies to the Secretary of Transportation; Attention: Motor Vehicle Safety Performance Service, National Highway Safety Bureau, Federal Highway Administration, U.S. Department of Transportation, Washington, D.C. 20591.

Data received have shown that the rim references indicated in the proposed Standards were inadequate in coverage. Therefore, a more comprehensive list of foreign and domestic trade association publications containing appropriate rim standards or practices has been referenced in the Standards.

Data received demonstrated that the bead unseating and tire strength requirements were inappropriate for certain groups of small tires. Accordingly, tires were regrouped and the test values revised to provide requirements for these small tires that are proportional to the requirements for other sizes of tires.

Although Standard No. 109 applies to tires for use on passenger cars manufactured after 1948, some of the tires covered by the Standard may also be used on earlier model vehicles.

The testing procedures set forth in the Standard, size designations, and related data are based upon existing standards or practices using information furnished by such organizations as the Society of Automotive Engineers, Federal Trade Commission, Tire and Rim Association, European Tire and Rim Technical Organization, Japanese Standards Association, Japan Automobile Tire Manufacturers Association, Rubber Manufacturers Association, Tyre Manufacturers Conference, Ltd., and the Society of Motor Manufacturers and Traders, Ltd.

To permit production of sufficient quantities of tires complying with the requirements of Standard No. 109 after its effective date of January 1, 1968, Standard No. 110 applies to passenger cars manufactured on or after April 1, 1968.

A single table of load/pressure values for radial ply tires was included in the notice and this was supported by many comments. Other comments stressed the importance of including different load/pressure values for optimum tire deflections. Although a single table of load/pressure schedules combining these values for these radial ply tires would be desirable, it was not considered advisable to include such a table in the standard promulgated under the present notice.

In accordance with section 201 of the Act, S4.3 of Standard No. 109 requires that each tire be labeled with the name of the manufacturer or his brand name and an approved code mark to permit the tire seller to identify the tire manufacturer upon the purchaser's request. Any tire manufacturer desiring an approved code mark should apply for his code number assignment to the Secretary of Transportation; Attention:

Motor Vehicle Safety Performance Service, National Highway Safety Bureau, Federal Highway Administration, U.S. Department of Transportation, Washington, D.C. 20591.

Several comments, including the suggested use of a "load range" system, will be considered for future rulemaking. (See 32 F.R. 14279).

Since it was clearly the intent of the Congress that, to enhance the safety of the general public, Federal Motor Vehicle Safety Standards for tires become effective as soon as practicable, and since no adverse comments were received pertinent to the proposed effective date presented in the advance notice of proposed rulemaking (32 F.R. 2417), at a Government-industry technical meeting, and in the notice of proposed rulemaking (32 F.R. 10812), and no undue burden was demonstrated, good cause is shown that an effective date earlier than 180 days after issuance is in the public interest.

In consideration of the foregoing, § 371.21 of Part 371, Initial Federal Motor Vehicle Safety Standards, is amended . . . Standard No. 109 becomes effective January 1, 1968, and Standard No. 110 becomes effective April 1, 1968.

(Secs 103, 119, National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407); delegation of authority of Mar. 31, 1967 (32 F.R. 5606), as amended Apr. 6, 1967 (32 F.R. 6495), July 27, 1967 (32 F.R. 11276), Oct. 11, 1967 (32 F.R. 14277), Nov. 8, 1967).

Issued in Washington, D.C., on November 8, 1967.

Lowell K. Bridwell,
Federal Highway Administrator.

32 F.R. 15792
November 16, 1967

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD NO. 109
New Pneumatic Tires—Passenger Cars
(Docket No. 18)

Motor Vehicle Safety Standard No. 109 (32 F.R. 15792) specifies tire dimensions and laboratory test requirements for bead unseating resistance, strength, endurance, and high speed performance; defines tire load ratings; and specifies labeling requirements for new pneumatic tires for use on passenger cars manufactured after 1948.

Certain labeling requirements are set forth in S4.3, including, in paragraph (i), a requirement for an approved recital (or the symbol specified in Figure 1) that the tire conforms to applicable Federal Motor Vehicle Safety Standards. Figure 1 contains lettering detail dimensions for that symbol.

The Federal Highway Administration has determined that it is not necessary to specify the width and stroke of individual letters nor the space between letters if the overall length and height is specified, and that more latitude is needed in the depth and overall length requirements for this symbol. Therefore, Standard No. 109 is being amended by striking out the unneeded dimensions and by providing increased latitude for the letter depth and the overall length requirements.

Since this amendment provides an alternative means of compliance, relieves a restriction, and

imposes no additional burden on any person, notice and public procedure hereon are unnecessary and good cause is shown that an effective date earlier than 180 days after issuance is in the public interest and the amendment may be made effective less than 30 days after publication in the *Federal Register*.

In consideration of the foregoing, § 371.21 of Part 371, Initial Federal Motor Vehicle Safety Standards, Standard No. 109 is amended by deleting Figure 1 (32 F.R. 15794) and in its place inserting the following Figure 1.

(Secs. 103, 119, National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407); delegation of authority of Mar. 31, 1967 (32 F.R. 6506), as amended Apr. 6, 1967 (32 F.R. 6495), July 27, 1967 (32 F.R. 11276), Oct. 11, 1967 (32 F.R. 14277), and Nov. 8, 1967 (32 F.R. 15710))

This amendment becomes effective January 1, 1968.

Issued in Washington, D.C., on December 11, 1967.

Lowell K. Bridwell,
Federal Highway Administrator.

33 F.R. 17938
December 15, 1967

**PREAMBLE TO AN AMENDMENT TO
FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 111**

**Rearview Mirrors
[Docket No. 81-21; Notice 2]**

ACTION: Final rule.

SUMMARY: This rule amends Federal Motor Vehicle Safety Standard (FMVSS) 111 to permit the use of nonuniform radius of curvature school bus mirrors to view the area immediately in front of the bus. Previously, only uniform radius mirrors could be used for this purpose. This action is taken in response to a petition from the North Carolina State Board of Education, and is intended to permit the use as original equipment of mirrors which provide a wider field of view of the area in front and along the side of the bus. The improved view will aid in detecting the presence of children in those areas.

EFFECTIVE DATE: September 6, 1983.

SUPPLEMENTARY INFORMATION: FMVSS 111 establishes requirements for mirror systems used on a variety of motor vehicles, including school buses. One requirement of that standard with regard to school buses is that those vehicles must have a crossview mirror permitting the bus driver to view the area in front of the bus. These mirrors are intended to aid bus drivers in determining, prior to moving from a stopped position (typically after loading or unloading children at a bus stop), whether any children are located in the area immediately in front of the bus. Being able to check those areas is important since, on average, approximately 40 pedestrians each year are involved in school-bus-related accidents.

Prior to the amendments made by this notice, the standard provided that crossview mirrors must be convex and have at least 40 square inches of reflective surface. Such mirrors must have a single radius of curvature which is at least 12 inches but no more than 25 inches. These specifications were intended to assure not only that the image views in the mirror would not be unduly distorted and would be large enough to be clearly seen, but also that the field of view of the mirror would be great enough to permit a view of the entire area in front of the bus.

North Carolina Board of Education petitioned the agency to permit the use of one specific type of mir-

ror manufactured by Mirror-Lite Co. The radius of curvature of this mirror varies from 3.5 inches near the outer edge of the mirror to approximately 4.5 inches in the central area. These small radii of curvature provide a much wider field of view than the crossview mirrors previously specified in FMVSS 111, permitting a view of not just the area in front of the bus but also along the side of the bus. Although this wider field of view is gained at the expense of a smaller image size and greater optical distortion, the agency considers the quality of the image to be adequate for its intended purpose. Further, the wider field of view could improve safety by enabling school bus drivers to see children that they could not see with current mirrors.

Therefore, the agency proposed to amend FMVSS 111 to permit the use of mirrors of this type. See 46 FR 60481, December 10, 1981. This proposal would have deleted minimum and maximum radius of curvature requirements and would have permitted the use of any nonuniform mirror surface.

The agency received approximately 50 comments on its proposal, mainly from State boards of education and school bus operators. Most of these commenters supported the use of nonuniform radius mirrors like the Mirror-Lite design, pointing out that the wider field of view provided by such mirrors should promote safety. Several other commenters suggested modifications to the agency's proposal. Based on these comments and the agency's further consideration of the relevant issues, the agency is amending FMVSS 111 to permit the use of mirrors like the Mirror-Lite design, although it is not limited to that design.

The agency received a number of comments regarding radius of curvature requirements. As noted above, FMVSS 111 has provided that crossview mirrors must have a single radius of curvature which must be at least 12 inches but not more than 25 inches. The maximum radius requirement was imposed to assure that the mirror provides an adequate field of view. An overly large radius would provide

an inadequate view since field of view decreases as radius of curvature increases. The minimum radius requirement was imposed to assure adequate image size and quality; as radius of curvature decreases, image size also decreases, and image distortion increases. Thus, the radius of curvature specifications reflect a trade-off between field of view on one hand and image size and accuracy on the other hand. The agency's proposal, in seeking to permit the use of mirrors with radii in the 3.5 inches to 4.5 inches range, deleted all radius of curvature requirements.

Donnelly Mirrors, Inc., pointed out that permitting unlimited variation in a mirror's radius of curvature would permit unacceptable levels of optical distortion. It was not the agency's intention to completely remove restrictions on radius of curvature for crossview mirrors. Rather, it was the agency's desire to permit the use of an additional type of mirror which had been shown to be highly effective. Therefore, this final rule retains the current maximum radius of curvature requirement and establishes a minimum radius requirement consistent with the Mirror-Lite design. Requirements were also established in response to this comment to assure that the mirror surface does not have major, abrupt changes in radius of curvature or other surface discontinuities which could cause excessive optical distortion.

The Grote Manufacturing Company (a mirror producer) and the Truck Safety Equipment Institute argued that the image produced by a mirror with a radius of curvature below 12 inches is too small to be readily identifiable. The agency disagrees. Based on NHTSA's own evaluation of the Mirror-Lite design in actual school bus service, the image provided by the mirror is adequate to tell the bus driver whether a child is in front of the bus or along the side of the bus. The agency was also impressed by the numerous comments received from bus operators who had experience with after market nonuniform radius mirrors, and found them to be superior in actual service to the uniform radius mirror. While it is true that the image provided by the Mirror-Lite mirror is smaller and more distorted than that of a uniform 12-inch radius mirror, the agency believes that the image size and quality for these mirrors is adequate for its intended purpose and that these disadvantages are fully offset by the wider field of view provided by the former. It should be pointed out that this mirror is to be used for a very limited

purpose, i.e., to determine whether a child is in close proximity to the front of the school bus or along the side, especially where the child exits from the bus. While a small radius mirror might be inadequate to judge distance and velocity as would be required in an automotive rearview mirror, the agency finds them adequate for their intended purpose, and even superior in terms of providing an additional view of the side of the bus, another potentially dangerous area.

Several commenters suggested imposing performance requirements for the field of view of the crossview mirror, rather than specifying the radius of curvature. While the agency believes this to be a desirable goal, it is beyond the scope of this rulemaking. Specifying the field of view is a complicated task, which the agency is still evaluating in the context of its major rulemaking on rearview mirrors. See 43 FR 51657, November 6, 1978.

Grote also recommended clarifying the requirement that crossview mirrors must have 40 square inches of reflective surface. They suggested that this area requirement should be expressed in terms of the effective projected area of the reflective surface measured on a plane at right angles to the axis of the mirror. Without such clarification, the requirement could be interpreted to refer to surface area, which would vary for a mirror of given diameter, depending on the radius of curvature. The agency agrees and is adopting Grote's suggestion for the newly authorized mirrors.

Several commenters suggested that FMVSS 111 should require the use of two convex crossview mirrors, one mounted on each side of the bus. The current requirement is for only one mirror mounted on either side of the bus, but many school buses employ additional crossview mirrors. The agency believes that the use of additional crossview mirrors on each side of the bus would provide both a better view of the front of the bus and a view of each side of the bus. The side area can be a major concern, particularly on the passenger exit side, since children standing in that area can be hit as the bus pulls away from the stop and makes a turn. However, requiring additional mirrors is a matter beyond the scope of the proposal issued in this rulemaking. The agency will consider requiring more additional mirrors in subsequent rulemaking. In the meantime, school districts are strongly encouraged to use additional mirrors as

necessary to permit the driver to view the areas along the front and both sides of the bus.

The agency has considered the economic and other effects of this action and has determined that the rule is not a major rule within the meaning of Executive Order No. 12291. The agency has further determined that the action is not significant within the meaning of the Department of Transportation's regulatory procedures. The basis for these determinations is that the rule relaxes a design restriction in the current standard. It does not require school buses to be equipped with new mirrors; it merely gives manufacturers the flexibility to use a different type of mirror, whose performance is at least as effective as current mirrors. Accordingly, the agency has not prepared a full regulatory evaluation.

The agency has also considered the effect of this action in relation to the Regulatory Flexibility Act, and I certify that it would not have a significant economic effect on a substantial number of small entities. The effect of the amendment on small businesses is to give manufacturers the option of using new types of mirrors. It does not require any manufacturer to change its current practice.

The action will not have a significant effect on a substantial number of small government jurisdictions and small organizations. Those entities are affected because they are purchasers of school buses. It is unknown how many of them will exercise the voluntary choice of using new types of mirrors, but the cost impact, if any, should be minimal. Accordingly, no regulatory flexibility analysis has been prepared.

This action is being made effective on publication, to permit the immediate use of crossview mirrors which are at least equivalent to current mirrors in safety performance, and may be superior to current mirrors. Since this action "relieves a restriction," the immediate effective date is authorized under 5 U.S.C. 553(d). Since the immediate effective date may well promote safety and the amendment is merely an alternative method of compliance which does not necessarily impose additional costs or other burdens, the immediate effective date is in "the public interest" within the meaning of section 103(e) of the National Traffic and Motor Vehicle Safety Act, 15 U.S.C. 1392(e).

In consideration of the foregoing, section 9.2 of 49 CFR 571.111 is amended to read as follows:

S9.2 Outside crossview mirror. Each school bus, except one which is a forward control vehicle, shall have a convex mirror which complies with the requirements in paragraphs (a) and (b) of this section.

(a) The convex mirror shall have a radius of curvature not less than 3.5 inches and not more than 25 inches. A convex mirror whose radius of curvature at its periphery is not less than 12 inches and not more than 25 inches shall have a surface area which is not less than 40 square inches. A convex mirror whose radius of curvature at any point on the mirror is less than 12 inches shall have a projected area of not less than 40 square inches, measured on a plane at a right angle to the mirror's axis. A convex mirror with a nonuniform radius shall comply with the following criteria:

(1) The radius at the periphery of the mirror shall be not less than 75 percent of the radius at the center of the mirror.

(2) Along the intersection of any plane containing the axis of symmetry of the mirror and the surface of the mirror, the length of the radius, as measured by a spherometer, shall be monotonically non-increasing when moving from the axis of symmetry to the periphery along the intersection.

(3) Along the intersection described in paragraph (a)(2) of this section there shall be no discontinuities in the slope of the surface of the mirror.

(b) The mirror shall be installed with a stable support, and mounted so as to provide the driver a view of the front bumper and the area in front of the bus.

Issued on August 30, 1983.

Diane K. Steed
Deputy Administrator

**48 FR 40260
September 6, 1983**

MOTOR VEHICLE SAFETY STANDARD NO. 111

Rearview Mirrors

S1. Scope. This standard specifies requirements for the performance and location of rearview mirrors.

S2. Purpose. The purpose of this standard is to reduce the number of deaths and injuries that occur when the driver of a motor vehicle does not have a clear and reasonably unobstructed view to the rear.

S3. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, buses, school buses and motorcycles.

S4. Definition. "Unit magnification mirror" means a plane or flat mirror with a reflective surface through which the angular height and width of the image of an object is equal to the angular height and width of the object when viewed directly at the same distance except for flaws that do not exceed normal manufacturing tolerances. For the purposes of this regulation a prismatic day-night adjustment rearview mirror one of whose positions provides unit magnification is considered a unit magnification mirror.

["Convex mirror" means a mirror having a curved reflective surface whose shape is the same as that of the exterior surface of a section of a sphere. (47 F.R. 38698—September 2, 1982. Effective: September 2, 1982)]

S5. Requirements for passenger cars.

S5.1. Inside rearview mirror. Each passenger car shall have an inside rearview mirror of unit magnification.

S5.1.1. Field of view. Except as provided in S5.3, the mirror shall provide a field of view with an included horizontal angle measured from the projected eye point of at least 20 degrees, and sufficient vertical angle to provide a view of a level road surface extending to the horizon beginning at a point not greater than 200 feet to the rear of the

vehicle when the vehicle is occupied by the driver and four passengers or the designed occupant capacity, if less, based on an average occupant weight of 150 pounds. The line of sight may be partially obscured by seated occupants or by head restraints. The location of the driver's eye reference points shall be those established in Motor Vehicle Safety Standard No. 104 (§ 571.104) or a nominal location appropriate for any 95th percentile male driver.

S5.1.2. Mounting. The mirror mounting shall provide a stable support for the mirror, and shall provide for mirror adjustment by tilting in both the horizontal and vertical directions. If the mirror is in the head impact area, the mounting shall deflect, collapse or break away without leaving sharp edges when the reflective surface of the mirror is subjected to a force of 90 pounds in any forward direction that is not more than 45° from the forward longitudinal direction.

S5.2 Outside rearview mirror—driver's side.

S5.2.1. Field of view. Each passenger car shall have an outside mirror of unit magnification. The mirror shall provide the driver a view of a level road surface extending to the horizon from a line, perpendicular to a longitudinal plane tangent to the driver's side of the vehicle at the widest point, extending 8 feet out from the tangent plane 35 feet behind the driver's eyes, with the seat in the rear-most position. The line of sight may be partially obscured by the rear body or fender contours. The location of the driver's eye reference points shall be those established in Motor Vehicle Safety Standard No. 104 (§ 571.104) or a nominal location appropriate for any 95th percentile male driver.

S5.2.2. Mounting. The mirror mounting shall provide a stable support for the mirror, and neither the mirror nor the mounting shall protrude farther than the widest part of the vehicle

body except to the extent necessary to produce a field of view meeting or exceeding the requirements of S5.2.1. The mirror shall not be obscured by the unwiped portion of the windshield, and shall be adjustable by tilting in both horizontal and vertical directions from the driver's seated position. The mirror and mounting shall be free of sharp points or edges that could contribute to pedestrian injury.

S5.3 Outside rearview mirror passenger's side. Each passenger car whose inside rearview mirror does not meet the field of view requirements of S5.1.1 shall have an outside mirror of unit magnification or a convex mirror installed on the passenger's side. The mirror mounting shall provide a stable support and be free of sharp points or edges that could contribute to pedestrian injury. The mirror need not be capable of adjustment by tilting in both horizontal and vertical directions.

S5.4 Convex mirror requirements. Each motor vehicle using a convex mirror to meet the requirements of S5.3 shall comply with the following requirements:

S5.4.1 When each convex mirror is tested in accordance with the procedures specified in S12 of this standard, none of the radii of curvature readings shall deviate from the average radius of curvature by more than plus or minus 12.5 percent.

S5.4.2 [Each convex mirror shall have permanently and indelibly marked at the lower edge of the mirror's reflective surface, in letters not less than $\frac{3}{16}$ inch or more than $\frac{1}{4}$ inch high, the words "Objects in Mirror Are Closer Than They Appear." (48 F.R. 38842—August 26, 1983. Effective: August 26, 1983)]

S5.4.3 The average radius of curvature of each such mirror, as determined by using the procedure in S12, shall be not less than 35 inches and not more than 65 inches.

S6 Requirements for multipurpose passenger vehicles, trucks, and buses, other than school buses, with GVWR of 10,000 pounds or less.

S6.1 Each multipurpose passenger vehicle, truck and bus, other than a school bus, with a GVWR of 10,000 pounds or less shall have either—

(a) Mirrors that conform to the requirements of S5; or

(b) Outside mirrors of unit magnification, each with not less than 19.5 in² of reflective surface, installed with stable supports on both sides of the vehicle, located so as to provide the driver a view to the rear along both sides of the vehicle, and adjustable in both the horizontal and vertical directions to view the rearward scene.

S7. Requirements for multipurpose passenger vehicles and trucks with a GVWR of more than 10,000 and less than 25,000 pounds and buses, other than school buses, with a GVWR of more than 10,000 pounds.

S7.1. Each multipurpose passenger vehicle and trucks with a GVWR of more than 10,000 pounds and less than 25,000 pounds and each bus, other than a school bus, with a GVWR of more than 10,000 pounds shall have outside mirrors of unit magnification, each with not less than 50 in² of reflective surface, installed with stable supports on both sides of the vehicle. The mirrors shall be located so as to provide the driver a view to the rear along both sides of the vehicle and shall be adjustable both in the horizontal and vertical directions to view the rearward scene.

S8. Requirements for multipurpose passenger vehicles and trucks with a GVWR of 25,000 pounds or more.

S8.1 Each multipurpose passenger vehicle and truck with a GVWR of 25,000 pounds or more shall have outside mirrors of unit magnification, each with not less than 50 in² of reflective surface, installed with stable supports on both sides of the vehicle. The mirrors shall be located so as to provide the driver a view to the rear along both sides of the vehicle and shall be adjustable both in the horizontal and vertical directions to view the rearward scene.

S9. Requirements for school buses.

S9.1. Outside rearview mirrors. Each school bus shall have outside mirrors of unit magnification, each with not less than 50 in² of reflective surface, installed with stable supports on both sides of the vehicle. The mirrors shall be located so as to provide the driver a view to the rear along both sides of the vehicle and shall be adjustable both in the horizontal and vertical directions to view the rearward scene.

S9.2 Outside cross view mirror. [Each school bus, except one which is a forward control vehicle, shall have a convex mirror which complies with the requirements in paragraphs (a) and (b) of this section.

(a) The convex mirror shall have a radius of curvature not less than 3.5 inches and not more than 25 inches. A convex mirror whose radius of curvature at its persphery is not less than 12 inches and not more than 25 inches shall have a surface area which is not less than 40 square inches. A convex mirror whose radius of curvature at any point on the mirror is less than 12 inches shall have a projected area of not less than 40 square inches, measured on a plane at a right angle to the mirror's axis. A convex mirror with a non-uniform radius shall comply with the following criteria:

(1) The radius at the periphery of the mirror shall be not less than 75 percent of the radius at the center of the mirror.

(2) Along the intersection of any plane containing the axis of symmetry of the mirror and the surface of the mirror, the length of the radius, as measured by a spherometer, shall be monotonically non-increasing when moving from the axis of symmetry to the periphery along the intersection.

(3) Along the intersection described in paragraph (a) (2) of this section there shall be no discontinuities in the slope of the surface of the mirror.

(b) The mirror shall be installed with a stable support, and mounted so as to provide the driver a view of the front bumper and the area in front of the bus. (48 F.R. 40260—September 6, 1983. Effective: September 6, 1983)]

S10. Requirements for motorcycles.

S10.1. Each motorcycle shall have either a mirror of unit magnification with not less than 12.5 in² of reflective surface, or a convex mirror with not less than 10 in² of reflective surface and an average radius of curvature not less than 20 inches and not greater than 60 inches, installed with a stable support, and mounted so that the horizontal center of the reflective surface is at least 11 inches outward of the longitudinal centerline of the motorcycle. The mirror shall be adjustable by tilting in both the horizontal and vertical directions.

S11. Mirror construction. The average reflectance value of the reflective film employed on any

mirror required by this standard, determined in accordance with SAE Recommended Practice J964a, August 1974, shall be at least 35 percent. If a mirror is of the selective position prismatic type, the reflectance value in the night driving position shall be at least 4 percent.

S12 Determination of Radius of Curvature.

S12.1 To determine the average radius of curvature of a convex mirror, use a 3-point linear spherometer, which meets the requirements of S12.2, at the 10 test positions shown in Figure 1 and record the readings for each position.

S12.2 The 3-point linear spherometer has two outer fixed legs 1.5 inches apart and one inner movable leg at the mid-point. The spherometer has a dial indicator with a scale that can be read accurately to 0.0001 inches, with the zero reading being a flat surface.

S12.3 The 10 test positions on the image display consist of two positions at right angles to each other at each of five locations as shown in Figure 1. The locations are at the center of the mirror, at the left and right ends of a horizontal line that bisects the mirror and at the top and bottom ends of a vertical line that bisects the mirror. None of the readings are within 0.25-inch border on the edge of the image display.

S12.4 At each test position, the spherometer is held perpendicular to the convex mirror-surface and a record is made of the reading on the dial indicator to the nearest 0.0001 inch.

S12.5 Convert the dial reading data for each of the 10 test positions to radius of curvature calculations using Table I. Consider the change as linear for dial readings that fall between two numbers in Table I.

S12.6 Calculate the average radius of curvature by adding all 10 radius of curvature calculations and dividing by ten.

S12.7 Determine the numerical difference between the average radius of curvature and each of the 10 individual radius of curvature calculations determined in S12.5.

S12.8 Calculate the greatest percentage deviation by dividing the greatest numerical difference determined in S12.7 by the average radius of curvature and multiply by 100.

INTERPRETATION

(1) When a supplemental mirror is furnished in addition to the inside rearview mirror and the driver's side outside rearview mirror, the supplemental mirror need not be adjustable from the driver's seat.

(2) The location of the driver's eye reference point may be that established in Motor Vehicle

Safety Standard No. 104, or it may be a nominal location appropriate for any 95th percentile male driver.

(3) The horizontal angle is measured from the projected eye point, rather than the plane of the mirror.

32 F.R. 2413
February 3, 1967

TABLE I.—*Conversion Table From Spherometer Dial
Reading To Radius of Curvature*

| <i>Dial reading</i> | <i>Radius of curvature (in inches)</i> | <i>Dial reading</i> | <i>Radius of curvature (in inches)</i> |
|---------------------|--|---------------------|--|
| .00330 | 85.2 | .00980 | 28.7 |
| .00350 | 80.4 | .01004 | 28.0 |
| .00374 | 75.2 | .01022 | 27.5 |
| .00402 | 70.0 | .01042 | 27.0 |
| .00416 | 67.6 | .01060 | 26.5 |
| .00432 | 65.1 | .01080 | 26.0 |
| .00450 | 62.5 | .01110 | 25.3 |
| .00468 | 60.1 | .01130 | 24.9 |
| .00476 | 59.1 | .01170 | 24.0 |
| .00484 | 58.1 | .01200 | 23.4 |
| .00492 | 57.2 | .01240 | 22.7 |
| .00502 | 56.0 | .01280 | 22.0 |
| .00512 | 54.9 | .01310 | 21.5 |
| .00522 | 53.9 | .01360 | 20.7 |
| .00536 | 52.5 | .01400 | 20.1 |
| .00544 | 51.7 | .01430 | 19.7 |
| .00554 | 50.8 | .01480 | 19.0 |
| .00566 | 49.7 | .01540 | 18.3 |
| .00580 | 48.5 | .01570 | 17.9 |
| .00592 | 47.5 | .01610 | 17.5 |
| .00606 | 46.4 | .01650 | 17.1 |
| .00622 | 45.2 | .01700 | 16.6 |
| .00636 | 44.2 | .01750 | 16.1 |
| .00654 | 43.0 | .01800 | 15.6 |
| .00668 | 42.1 | .01860 | 15.1 |
| .00686 | 41.0 | .01910 | 14.7 |
| .00694 | 40.5 | .01980 | 14.2 |
| .00720 | 39.1 | .02040 | 13.8 |
| .00740 | 38.0 | .02100 | 13.4 |
| .00760 | 37.0 | .02160 | 13.0 |
| .00780 | 36.1 | .02250 | 12.5 |
| .00802 | 35.1 | .02340 | 12.0 |
| .00822 | 34.2 | .02450 | 11.5 |
| .00850 | 33.1 | .02560 | 11.0 |
| .00878 | 32.0 | .02680 | 10.5 |
| .00906 | 31.0 | .02810 | 10.0 |
| .00922 | 30.5 | .02960 | 9.5 |
| .00939 | 30.0 | .03130 | 9.0 |
| .00960 | 29.3 | .03310 | 8.5 |

PREAMBLE TO MOTOR VEHICLE SAFETY STANDARD NO 112

Headlamp Concealment Devices—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, Buses, and Motorcycles

(Docket No. 1-16)

A proposal to amend Part 371 by adding Federal motor vehicle safety standard No. 112, Headlamp Concealment Devices—Passenger Cars, Multipurpose Passenger Cars, Multipurpose Passenger Vehicles, Trucks, Buses, and Motorcycles, was published as an advance notice of proposed rule making on October 14, 1967 (32 F.R. 14280) and as a notice of proposed rule making on December 28, 1967 (32 F.R. 20865).

Interested persons have been given the opportunity to participate in the making of this amendment, and careful consideration has been given to all relevant matter presented.

Inadvertent actuation of a headlamp concealment devices, due to a defective condition thereby causing headlamps to be blacked out, has compromised the safety of occupants of the vehicle concerned and other highway users. There have been reports of several accidents and incidents caused by such inadvertent blacking out of headlamps. In addition, the Administrator considers headlamp concealment devices present a continuing hazard to motor vehicle safety in that they may inadvertently black out headlamps while headlamps are in use. This standard requires that fully opened headlamp concealment devices must remain fully opened whenever there is a loss of power to or within the device and whenever any malfunction occurs in components that control or conduct power for the operation of a concealment device. These requirements provide a fail-safe operation which serves to prevent further incidents of inadvertent blacking out of headlamps by headlamp concealment devices.

In addition, other safety performance criteria are established. Thus, whenever any malfunction occurs in components that control or conduct power for the actuation of the concealment de-

vice, additional means for fully opening each headlamp concealment device must be provided. A single mechanism must be provided for actuating the headlamp concealment device and illuminating the lights. The installation of each headlamp concealment device must be such that no component of the device, other than components of the headlamp assembly, need be removed when mounting, aiming and adjusting the headlamps. Headlamp beams that illuminate during opening and closing of the headlamp concealment device may not project to the left of or above the position of the beam in the fully opened position. Finally, within the temperature ranges specified, headlamp concealment devices must be fully opened in three seconds after actuation of the appropriate mechanism, except in the event of a power loss. These additional performance criteria meet the needs of motor vehicle safety by increasing the safe and reliable operation of headlamp concealment devices.

Several comments stated that a requirement for fail-safe operation under any combination of unforeseeable circumstances is unreasonable. The requirements expressed in S4.1 are not intended to impose responsibility for failures caused by abuse, poor maintenance practices or other conditions not encompassed by S4.1. Whether or not failure of a headlamp concealment device to remain in an open position once fully opened is a violation of the standard would, of course, depend upon whether the device failed under the conditions encompassed by the standard. Some comments requested that the conditions expressed in S4.1 be made test conditions and one commentator submitted a suggested test procedure to demonstrate compliance. Because of the wide variety of designs and types of

headlamp concealment devices currently in use, no single demonstration procedure is appropriate for all. Consequently, prescription of a standard demonstration procedure is neither practicable nor feasible under the circumstances. The Administrator concludes that the needs of motor safety require that headlamp concealment devices be fail-safe. The Administrator further concludes that the most appropriate method of meeting those needs and of preventing further hazard from obstructed headlamps caused by headlamp concealment device failures is by the prescription of fail-safe operational criteria, as specified in S4.1. Accordingly, the requests are denied.

A number of comments stated that the 3-second operating time requirement and the aiming requirements for rotating headlamps would impose unreasonable burdens in retooling and redesigning if the January 1, 1969, effective date is to be met. Based upon the data presented, the Administrator agrees with these comments. Accordingly, S4.5 and S4.6 are made effective January 1, 1970.

Several comments recommended additional provisions expressly permitting headlamp concealment devices that are automatically actuated by light sensing mechanisms. This standard is not intended to prevent the use of light sensing mechanisms. Consequently, language has been added to clarify this intention if the light sensing mechanism meets the same operational requirements prescribed for switch operated headlamp concealment devices.

Several comments requested inclusion of a provision in S4.3 permitting an additional separate control that actuates only the headlamp concealment device. The Administrator considers permitting this additional control would not be in the best interests of motor vehicle safety. The requests are, therefore, denied.

Other comments suggested that rotating headlamps be required to return to the correctly aimed position after a specified minimum number of opening and closing cycles that power be provided for at least one opening cycle after the vehicle engine has been stopped for a specified length of time; that a warning device be required to indicate to the driver that the concealment devices are malfunctioning; that requirements for aiming and adjusting of headlamps be expanded to insure that vehicle body structure and lamp ornaments will not interfere with these operations; that the standard prohibit designs which permit snow and ice to accumulate over the sealed beam headlamp units; that requirements be included to assure capability for opening concealment devices that are frozen shut; and that a standard be established to prohibit the use of headlamp concealment devices. Although some of these suggestions appear to have merit, they are all beyond the scope of the notice and will, therefore, be considered for future rule making action.

In consideration of the foregoing, § 371.21 of Part 371 of the Federal motor vehicle safety standards is amended by adding Standard No. 112, Headlamp Concealment Devices—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, Buses, and Motorcycles . . . effective January 1, 1969.

This rule-making action is taken under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (Public Law 89-563, 15 U.S.C. sections 1892 and 1407) and the delegation of authority of April 24, 1968.

Issued in Washington, D.C., on April 24, 1968.

Lowell K. Bridwell,
Federal Highway Administrator
33 F.R. 6469
April 27, 1968

PREAMBLE TO AMENDMENT TO MOTOR VEHICLE SAFETY STANDARD 112**Headlamp Concealment Devices—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, Buses and Motorcycles**

Motor Vehicle Safety Standard No. 112, published in the *Federal Register* on April 27, 1968 (33 F.R. 6469), specifies requirements for headlamp concealment devices for passenger cars, multipurpose passenger vehicle, trucks, buses and motorcycles manufactured after December 31, 1968.

Paragraph S4.1 requires that each fully opened headlamp concealment device remain fully opened whenever either or both of the following occur—

- a. Any loss of power to or within the headlamp concealment device;
- b. Any disconnection, restriction, short-circuit, circuit time delay, or other similar malfunction in any wiring, tubing, hose, solenoid or other component that controls or conducts power for operating the concealment device.

The purpose of S4.1 is to prevent a malfunctioning headlamp concealment device from inadvertently covering an illuminated headlamp. However, the Administrator has concluded that this paragraph may be construed to prohibit the closing of headlamp concealment devices while the headlamps are not illuminated. Consequently, paragraph S4.1 is being amended to clarify that its requirements apply only while the headlamps are illuminated.

Since this amendment provides clarification and imposes no additional burden on any person, notice and public procedure hereon are unnecessary. It is therefore found, for good cause shown, that an effective date earlier than 180 days after issuance is in the public interest and in the interest of motor vehicle safety.

In consideration of the foregoing, § 371.21 of Part 371, Federal Motor Vehicle Safety Standards, Motor Vehicle Safety Standard No. 112 (33 F.R. 6469), paragraph S4.1 is amended effective January 25, 1969. . . .

This amendment is issued under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (15 U.S.C. 1392, 1407) and pursuant to the delegation of authority from the Secretary of Transportation, Part 1 of the regulations of the Office of the Secretary (49 CFR 1.4(c)).

Issued on January 22, 1969.

John R. Jamieson, Deputy
Federal Highway Administrator

34 F.R. 1246
January 25, 1969

MOTOR VEHICLE SAFETY STANDARD NO. 112

Headlamp Concealment Devices—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, Buses and Motorcycles

S1. Scope. This standard specifies requirements for headlamp concealment devices.

S2. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, buses, and motorcycles.

S3. Definitions. “Fully opened” means the position of the headlamp concealment device in which the headlamp is in the design open operating position.

“Headlamp concealment device” means a device, with its operating system and components, that provides concealment of the headlamp when it is not in use, including a movable headlamp cover and a headlamp that displaces for concealment purposes.

“Power” means any source of energy that operates the headlamp concealment device.

S4. Requirements.

S4.1 While the headlamp is illuminated, its fully opened headlamp concealment device shall remain fully opened whenever either or both of the following occur—

(a) Any loss of power to or within the headlamp concealment device;

(b) Any disconnection, restriction, short-circuit, circuit time delay, or other similar malfunction in any wiring, tubing, hose, solenoid or other component that controls or conducts power for operating the concealment device,

S4.2 Whenever any malfunction occurs in a component that controls or conducts power for the actuation of the concealment device, each closed headlamp concealment device shall be capable of being fully opened—

(a) By automatic means;

(b) By actuation of a switch, lever or other similar mechanism; or

(c) By other means not requiring the use of any tools. Thereafter, the headlamp concealment device must remain fully opened until intentionally closed.

S4.3 Except for cases of malfunction covered by S4.2, each headlamp concealment device shall be capable of being fully opened and the headlamps illuminated by actuation of a single switch, lever, or similar mechanism, including a mechanism that is automatically actuated by a change in ambient light conditions.

S4.4 Each headlamp concealment device shall be installed so that the headlamp may be mounted, aimed, and adjusted without removing any component of the device, other than components of the headlamp assembly.

S4.5 After December 31, 1969, the headlamp beam of headlamps that illuminate during opening and closing of the headlamp concealment device may not project to the left of or above the position of the beam when the device is fully opened.

S4.6 Except for cases of malfunction covered by S4.2, after December 31, 1969, each headlamp concealment device shall, within an ambient temperature range of -20 to $+120$ degrees F., be capable of being fully opened in not more than three seconds after actuation of the mechanism described in S4.3.

34 F.R. 1246

January 25, 1969

PREAMBLE TO MOTOR VEHICLE SAFETY STANDARD NO. 113

Hood Latch Systems—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses (Docket No. 1-17)

A proposal to amend Part 371 by adding Federal motor vehicle safety Standard No. 113, Hood Latch Systems—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses, was published as an advance notice of proposed rule making on October 14, 1967 (32 F.R. 14280), and as a notice of proposed rule making on December 28, 1967 (32 F.R. 20866).

Interested persons have been given the opportunity to participate in the making of this amendment, and careful consideration has been given to all relevant matter presented.

This new standard requires that all motor vehicles to which it is applicable be equipped with a hood latch system. Additionally, in those instances where a vehicle is equipped with a front opening hood, which in any open position partially or completely obstructs a driver's forward view through the windshield, a second latch position on the hood latch system or a second hood latch system must be provided.

Available data reveals that inadvertent hood openings pose a serious hazard to the safe operation of motor vehicles, particularly in the case of front opening hoods. By requiring a hood latch system for all hoods, and under certain circumstances, a second position on that system or an independent second system, this standard will help to reduce incidents of inadvertent hood openings.

All the comments support the need for a hood latch system or hood latch systems, as the case may be. Several commentators requested inclusion of a definition of "hood" and "front opening hood." The Administrator agrees that "hood" should be defined and has defined it as any exterior movable body panel forward of the windshield used to cover an engine, luggage, storage,

or battery compartment. However, the Administration concludes that a definition of "front opening hood" is unnecessary; that phrase is sufficiently definite and is clearly distinguishable from a "side opening" or "rear opening" hood.

Several commentators conditioned their support upon the understanding that the requirement for front opening hoods could be met by a single latch system with two positions, by two separate primary latch systems, or separate primary and secondary latches. Language changes have been made to S4.2 to clarify that all of these types of installations are acceptable.

Several commentators expressed concern over the lack of quantitative performance criteria for hood latch systems. The Administrator finds that additional research and study are necessary before meaningful quantitative performance criteria can be appropriately specified.

In consideration of the foregoing, § 371.21 of Part 371 of the Federal motor vehicle safety standards is amended by adding Standard No. 113, Hood Latch Systems—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses . . . effective January 1, 1969.

This rule making action is taken under the authority of sections 103 and 119 of the National Traffic and Motor Vehicle Safety Act of 1966 (Public Law 89-563, 15 U.S.C. sections 1392 and 1407), and the delegation of authority of April 24, 1968.

Issued in Washington, D.C., on April 24, 1968.

Lowell K. Bridwell,
Federal Highway Administrator

33 F.R. 6470
April 27, 1968

MOTOR VEHICLE SAFETY STANDARD NO. 113

Hood Latch Systems—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses

S1. Purpose and scope. This standard establishes the requirement for providing a hood latch system or hood latch systems.

S2. Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks and buses.

S3. Definitions. "Hood" means any exterior movable body panel forward of the windshield that is used to cover an engine, luggage, storage, or battery compartment.

S4. Requirements.

S4.1 Each hood must be provided with a hood latch system.

S4.2 A front opening hood which, in any open position, partially or completely obstructs a driver's forward view through the windshield must be provided with a second latch position on the hood latch system or with a second hood latch system.

**33 F.R. 6471
April 27, 1968**

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